

DOCUMENT RESUME

ED 303 012

EC 211 900

AUTHOR Johnson, Peg L.
TITLE Express Yourself: Communication Disabilities Need Not Be Handicaps.
PUB DATE 87
NOTE 182p.
AVAILABLE FROM Communication Skill Builders, 3830 E. Bellevue, P.O. Box 42050, Tucson, AZ 85733 (\$9.95 plus \$2.00 postage and handling, Catalog No. 7593-B).
PUB TYPE Guides - Non-Classroom Use (055)
EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Communication Aids (for Disabled); *Communication Disorders; Computer Software; *Computer System Design; *Electronic Equipment; Financial Support; *Input Output Devices; *Microcomputers; Needs Assessment; Selection; Speech Synthesizers
IDENTIFIERS *Augmentative Communication Systems

ABSTRACT

Individuals with communicative disorders can achieve self-expression through the use of portable electronic augmentative communication aids. Real-life examples describe how individuals use microcomputers and other communication aids, such as "Express III," "Light Talker," "Phonic Mirror Handivoice 110," "Canon Communicator Mark II," "TETRAscan," "Votrax Speech Synthesizer," "Gemini Eye Printer," "Rescue Speech System," "Softkey System," "Koala Pad," "Echo GP," "AVOS System," and software using Blissymbolics. To select the best device, prospective users must identify the need for a communication device, the degree to which it will be used, limitations imposed by the disability, and particular functions required. Important factors to consider include communication speed, independent operation, input methods, types of output, language characteristics, flexibility and growth, feedback characteristics, portability, costs, and service and support. An overview is presented of types of portable communication devices, covering: devices using direct selection for input, scanning, or either; devices for individuals who are blind, visually impaired, deaf-blind, or hearing-impaired; telephone devices for motor-impaired persons and for speech amplification; and speech synthesizers. Sources of funding are identified, along with steps in developing a funding plan. The book concludes with an outline of trends and challenges, and a list of resources, including manufacturers of communication aids, organizations, etc. (JDD)

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EXPRESS YOURSELF

Communication Disabilities Need Not Be Handicaps

**BY
PEG L. JOHNSON**

***SPECIAL THANKS
TO
JANE LARSON***

Published by
Pegijohn
6432 Fifth Avenue South
Richfield, MN 55423

(\$9.95, plus \$2.00 postage and handling)

To
all communication disabled persons
who are seeking

Better QUALITY of

and

More EQUALITY in

all aspects of living in today's
space-age, high-tech society.

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ACKNOWLEDGEMENTS

I acknowledge, with special thanks, the help of the following individuals who contributed their time, knowledge and expertise to make this book a reality.

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Sorenson, Marilyn (deceased)
Spence, Pamela

FOREWORD

This book is the result of a college research project that was designed to examine how individuals with various types of communicative disorders, as a result of physical impairments, are currently achieving various degrees of self-expression through the use of electronic augmentative communication aids. It examines the effect these aids have had on their lives, the types of aids that are available to meet various disabilities (seeing, speaking, hearing), and most importantly the mechanisms of selection and funding.

The information, conclusions, and practical applications contained in this book are the result of personal on-sight interviews: (1) with professionals (speech and language pathologists, physical and occupational therapists, special education teachers and administrators, health care professionals, rehabilitation engineers and technicians), (2) with fifteen individuals who are communication disabled and are using augmentative communication aids, (3) with technical specialists and representatives of manufacturers of communication aids, and (4) with knowledgeable professionals conducting seminars and workshops addressing communication disabilities. This information was supplemented by a comprehensive review of the current literature available on the subject. The product information (contained in PART IV) was obtained personally or by mail from 135 manufacturers and distributors of electronic communication aids.

As the study progressed four things became apparent:

First, that information regarding augmentative communication aids is totally fragmented. It can be obtained only through considerable persistence and effort. It was not at all unusual to make numerous phone calls and travel hundreds of miles to see a firsthand demonstration of a particular communication aid. It was even more difficult to locate persons who were actually using augmentative communication devices. This information was obtained one piece at a time; in interviews with professionals working with disabled users, from manufacturer's representatives who had sold a particular device, from educational institutions, and from health and social service organizations. However, one aspect of gathering this information was most gratifying. The disabled users were delighted at the opportunity to demonstrate their augmentative communication skills; skills that have enabled them, in many cases, to have authentic and meaningful interactions with others.

Second, that there is no universally acceptable terminology being used in the discussion of various aspects of this subject. For example, there is considerable disagreement as to the meaning of terms such as: non-vocal, non-oral, non-verbal, and non-speaking; impairment, disability, and handicap; communication aids, devices, and systems; or medical purpose, accepted community standard, etc.

Third, a real need exists for augmentative communication aids within a large segment of the physically disabled population. While a non-disabled person can approach computers or computer-like devices on a "take it or leave it" basis, a severely disabled person must often look at them as a lifeline for survival. It has been estimated by the National Center for Health Statistics that there are: 8,200,000 visually impaired, 17,000,000 hearing impaired, and 2,100,000 speech impaired. These estimates include impairments resulting from birth defects, strokes, debilitating diseases, accidents and other causes.

Fourth, that a wide-variety of state-of-the-art communication devices are available to meet many disabled persons needs but appropriate selection and funding are the two major obstacles to utilization of this existing technology.

This book was published to share the information obtained from this study with other individuals who are communication disabled, especially today's adult population who did not have the opportunity to become acquainted with high-tech electronic aids in the educational system; their families; and those professionals and disabled users who so willingly contributed their expertise to the study. In addition, perhaps teachers; counselors; rehabilitation, health and social service professionals; providers of services to the disabled and other interested persons may find this book useful as a reference source. It does not attempt to cover stationary microcomputers or software, as some excellent books and publications are available on those subjects. The focus of this book is on portable communication devices which enable users to interact with others in a wide-variety of environments.

During the research on this project, I was unable to contact many very knowledgeable and talented professionals, who are extremely valuable sources of information and guidance for individuals who are communication disabled and for that I'm sorry. Those of us who are communication disabled need all the help we can get.

Ms. Jamie Becker, an organizer for the Twin Cities Chapter of Handicapped Organized Women, was quoted in an article in the *St. Paul Pioneer Press*: "As a whole, people tend to look at disabled

people who can't talk or move well and assume they don't have any brains." It is regrettable that society, in general, is not more tolerant of individuals who are blind, visually impaired, deaf, hearing impaired, deaf-blind, speech impaired and motor impaired. To a very large degree, their destiny is closely tied to their ability to successfully communicate with others, through speech or graphics or both. Without a satisfactory means of augmentative communication, their potential can never be fully realized. While these communication aids cannot eliminate an individual's disability, they can decrease the degree to which the disability is a handicap. That's what this book is all about.

Peg L. Johnson

PART I

INTRODUCTION TO AUGMENTATIVE COMMUNICATION AIDS

"... if all my possessions were taken from me with one exception, I would choose to keep the power of communication, for by it I would soon gain all the rest."

Daniel Webster

There are various populations of people whose communication abilities are greatly affected by their physical impairments. For example: the visually impaired, hearing impaired, deaf-blind, speech impaired, motor impaired, and those with multiple impairments. The degree of impairment, disability or handicap varies with the individual and ranges from mild to severe. Individuals who are blind or visually impaired generally have no problem with speech, but their inability to see what they are writing or typing may affect accurate output. Individuals who are deaf or hearing impaired may not have a problem with graphics (writing, typing, etc.), but their inability to hear normal speech may reduce their linguistic fluency. Individuals who are impaired only in the production of sounds/words (such as persons with laryngectomies) generally do not have a problem with graphics. Individuals who are motor impaired (for example, persons with arm or hand paralysis or weakness from polio or spinal cord injury) would generally have a problem with graphic output. However, individuals who have multiple impairments (for example, cerebral palsy, amyotrophic lateral sclerosis, or deaf-blind persons) probably have the greatest communication disabilities as a result of their impairments.

Augmentative communication aids are now commercially available that have the potential to enable these populations of people to communicate with others more effectively. Severely motor impaired individuals with as little as a single, consistent, voluntary physical action can control a computer with only a single switch. This enables them to "talk", print hard copy, use visual monitors, print braille, play games, control the environment, and communicate with other computers. Speech synthesizers can be programmed to speak for the speech and hearing impaired. They also enable the blind and visually impaired to hear letters and words that appear on a visual display monitor, and for those with limited motor skill, auditory scanning allows them to access computers. With a TDD (telecommunication device for the deaf) or a modem connected to a computer the hearing impaired can instantly transmit messages to each other over the telephone. These are only a few examples of the technology that is currently available to help individuals enrich their lives and perform tasks that are otherwise impossible, and more new innovative communication aids are continually being developed. Dr. Frank Bowe, author of *Personal Computers and Special Needs* said, "This technology is going to change lives as nothing has before."

These augmentative aids are not intended as replacements for a

person's own ability to communicate, but to maximize a user's opportunity to obtain an education, secure employment, and interact in society. Many individuals, by augmenting their own ability to communicate more effectively, are now experiencing the joy of sharing their ideas and their feelings with others. This makes it possible for them to have a say in, and as much as possible, control over their own day-to-day lives. This, in turn, decreases the user's dependence on the interpretive role of a third party and allows respite for the primary caregivers. Studies show that increased self-esteem may be the primary benefit in using a communication device. Any increase in self-esteem usually affects, in a positive way, all aspects of life. This is very evident as one reviews the practical applications. (Contained in PART II)

Any discussion of communication aids with communication disabled adults, often evokes a mixed reaction. Some, who are unfamiliar with these high-tech devices, are both delighted and apprehensive. Delighted by the prospect of being able to more effectively express their needs, hopes, and desires; while at the same time, they may be apprehensive at the prospect of using one. Fortunately, in the communication disabled population, as in the non-disabled population, there are those men and women who, for various reasons, are more assertive, have a strong support group, have access to interested professionals or greater financial support, and can become the innovators or early adapters of new technologies. They, in effect, become the trail blazers among the communication disabled population.

The following practical applications provide real-life examples of how some men and women are using communication aids to decrease the limits imposed upon them by their disabilities.

PART II

PRACTICAL APPLICATIONS

The practical applications in this section resulted from personal on-site interviews with individuals disabled by cerebral palsy, spinal cord injuries, debilitating diseases, blindness and deafness.

In the relatively short period of time that has elapsed since these interviews, very encouraging progress has been made and several severely physically disabled individuals in this area are now using the newly developed state-of-the-art portable communication devices, thanks to the efforts of dedicated professionals in rehabilitation, education, and manufacturing. Hopefully, some of the "trail blazers" in the following applications, who are using portable devices that are now obsolete when compared with today's technology, will have an opportunity for a reevaluation and upgrade to a new more appropriate device.

LAKE: Speech and Motor Impairment

Lake is thirty-six years old and was born with severe athetoid cerebral palsy. His only means of communication during the first ten years of his life was to point with his eyes, shake his head yes or no, or stick out his tongue. With the aid of a manual headpointer developed by his father, he was able to strike the keys on an electric typewriter. Using this technique, Lake completed high school and two years of college.

In 1979, the Department of Vocational Rehabilitation provided him with a portable computerized communication device, which was much easier and faster to operate, and considerably more effective than the conventional word board that he normally carried with him. In 1982, the Department of Vocational Rehabilitation provided him with an Apple computer to assist him in pursuing his goal of becoming a self sufficient, independent person.

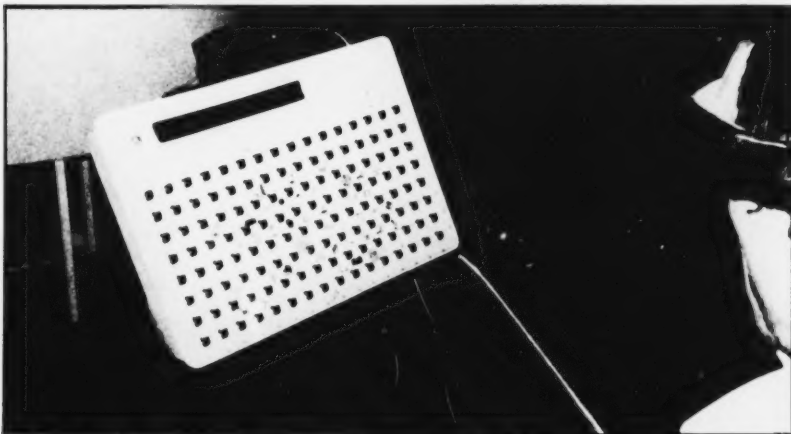
Lake's effective use of these augmentative communication devices enabled him to secure, as he said, "The first real job of my life." In 1983, he was hired as a special consultant for the Prentke Romich Company. In this capacity, he takes an active role in conducting and teaching seminars on the use of Prentke Romich augmentative communication devices. In 1985, he founded his own company, Kissick's Consultants, Inc., and is the Prentke Romich Company dealer within a 50-mile radius that includes Minneapolis and St. Paul.



Lake with a light sensor attached to a headband over his left ear inputting data into the Express III.

The Express III offered Lake two forms of output which he found useful depending on the situation. Messages could be typed onto a 40-character display screen. This screen enabled people to read what Lake was communicating rather than having to remember, letter by letter, what was spelled out on his old word board. To speed up the communication process, Lake often abbreviated and deleted letters and words from sentences. For example, "R U GOING TO B AT METING ON SAT PM?" Lake found that functional communication requires as much speed as possible so every keystroke that could be eliminated helped him to facilitate everyday conversation. Messages could also be printed out on wide strips of roll paper as a record of the conversation, a memo, etc. The Express III was also capable of spoken output by adding an optional voice synthesizer and Lake found this very helpful. In addition, the device was portable and was attached to his wheelchair with special mounting equipment. Lake found that a combination of mobility and auditory speech was a bridge to more outside contacts. He also used the device to access his Apple computer. This enabled him to use a variety of Apple software packages.

In the Fall of 1985, Lake again upgraded his communication device to the new Light Talker, that had recently been released by the Prentke Romich Company. It is less than half the size and weight of the Express III, which increases its portability. It gives him built-in synthesized speech and a 2-line, 40 characters/line display screen. (Information regarding the Light Talker is available in PART IV.)



Lake with his Light Talker attached to his wheelchair with special mounting equipment.

Lake is an excellent example of what can be accomplished by an individual who is both severely speech and motor impaired, who uses augmentative communication aids. He is able to live independently in a single bedroom apartment and communicate his needs to six attendants who come and go on a daily basis. The use of electronic communication aids has opened up a whole new world of opportunity for him in business and society.

PAM: Speech and Motor Impairment

Pam is twenty-nine years old and was born with athetoid cerebral palsy. Due to her slow and unclear speech her communications were mainly confined to family and friends. Pam's neighborhood peers were often unable to take the time to establish a friendship with her, so she felt alone and isolated. A word board served to augment her poor speech during her high school years at Jamestown, North Dakota, as well as her years at Southwest State University where she majored in business. After college, Pam moved to Minneapolis to take advantage of Courage Center's unique program, geared towards developing independent living skills. The Center assessed and evaluated her communication needs and experimented with several speech synthesizers until a suitable augmentative device was found.

The Department of Vocational Rehabilitation, in conjunction with Medical Assistance, provided the funding for her Phonic Mirror: Handivoice 110. (The Company has since replaced its Model 110 with newer models.) Pam sometimes feels that people are more interested in the operation of the voice synthesizer than they are in dealing directly with her on a person-to-person basis, but at least she is able to interact with them. She has found that some people have a difficult time understanding its robotic voice. Pam hopes that someday speech synthesizers will be available that produce a better quality speech output. However, in spite of its robotic voice, there are times when her Handivoice allows her the freedom to be a self-sufficient, interactive citizen. Activities such as shopping or just meeting new people are less stressful because of this device. The mere knowledge that her impaired speech is backed up by an augmentative device gives her a feeling of security in times of stress. She transports the device on a special wheelchair tray which was designed and made by Courage Center's Rehabilitation Department.



Pam operating her Handivoice 110 speech output device.

SHELLEY: Speech and Motor Impairment

Shelley is thirty-seven years old and was born with athetoid cerebral palsy. Due to a severe speech impairment, her family had problems communicating with her effectively. Nodding yes or no was her only means of expression. The involuntary movements of her hands made the use of paper and pencil impossible. She learned to use a headpointer and a word board and was able to do minimal typing on an electric typewriter using a headpointer. She was a student at the Special School for the Handicapped in North Dakota and then spent four years at Cambridge State Hospital. Shelley is now living in a residential facility for physically handicapped young adults.

She uses a Canon Communicator Mark II that provides only a single line tape printout. The process is very time-consuming for both parties involved in the communication. A short simple phrase can often take

as much as ten minutes to type out, due to her severe lack of motor control. Common messages are often planned and typed on the tape printout ahead of time to expedite the communication process. In spite of this time-consuming process, Shelley is grateful for a means to convey her thoughts and needs.

By mounting the device on a tilted podium on her wheelchair lapboard and using a headpointer, Shelley is able to print out her needs and ideas letter by letter on to the narrow strip of tape. The rechargeable battery pack is attached to her lapboard with velcro.



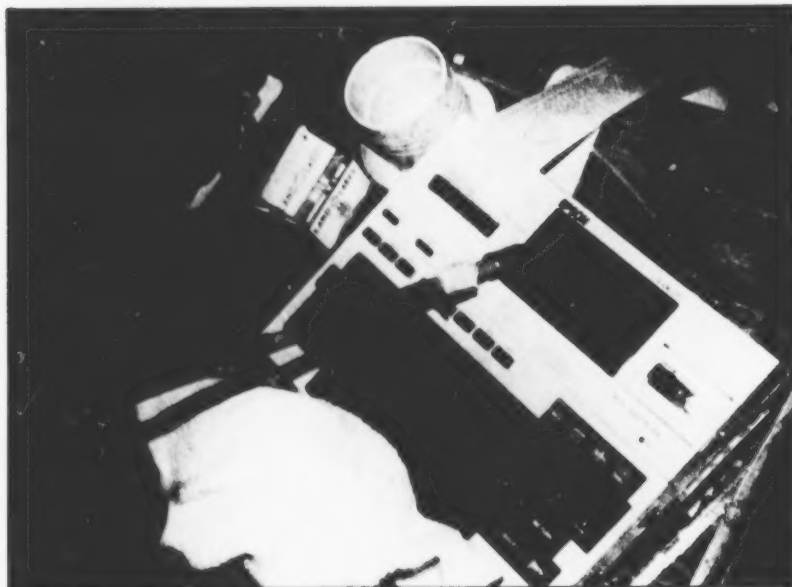
Shelley operating the Canon Communicator using a headpointer.

The residential facility where she lives has ten individuals using Canon Communicators. A resident is hired to monitor the devices to make certain that they are loaded with paper and that the batteries are always charged.

DARREN: Speech and Motor Impairment

Darren is twenty-one years old. At the age of twelve, he became paralyzed as a result of a brain stem infraction. He spent a year at Courage Center to acquire some independent living skills. While at the Center, he learned to operate an HX-20 Epson microcomputer using a mouthstick, which enabled him to communicate without the assistance

of a third party interpreter. Darren now lives in a group home with other disabled peers. He likes the feeling of independence which this kind of living arrangement gives him. He enjoys art and is proud of his five or six pencil drawings adorning his walls. With the help of his computer, he hopes to go back to school to study art.



Darren operating his HX-20 microcomputer using a mouthstick.

The Epson HX-20 offers Darren two methods of output: a 4-line, 20 characters/line display screen and a paper tape printout. The computer is battery operated and has a standard typewriter keyboard. Darren is able to type out messages and codes with a mouthstick securely held between his teeth. The Trace Research and Development Center for the Severely Communicatively Handicapped in Madison, Wisconsin, preprogrammed his computer with 100 of his most frequently used survival words and expressions. Preprogrammed phrases can be printed out by typing in a letter number code. For example, by typing "a1" the computer will type out "need a doctor" saving him several keystrokes. Since preprogrammed messages do not meet all of his communication needs, it is often necessary for him to type out individual words, which is a slow and laborious process. By combining his preprogrammed codes with standard typewriting techniques,

Darren is able to speed up his communication, enabling him to more effectively interact with others.

The following are examples of Darren's preprogrammed vocabulary phrases:

a0= Want to be alone\	i0= HI im Darren \
a1= I need a doctor\	i1= Born New Hampshire
a2= I need a dentist\	i2= Moved to Wis.at 7\
a3= I need a comode\	i3= Im already late\
a4= I need my urinal\	i4= I have appointment\
a5= Feet on footrest\	i5= My birthday Sept15\
a6= Please do laundry\	a0= Want to eat out?\
a7= Get splints please\	a1= How are you?\
a8= Instruction on wall\	a3= wendy masmen\
a9= Belt me in\	a4= I need my\
b0= I need set up\	a5= My book\
b1= Brush my teeth?\	r0= assistance\
b2= Comb my hair?\	r1= Hi im Darren\
b3= Help me shower?\	r2= Charge Tonight\
b4= Wash my hair?\	r3= Fill chair batter\
b5= Shave me?\	r4= Store this in box\
b6= Can I have for?\	r5= Use sandwich clip\
b7= Mail my letter to.	r6= Write me A note\
c0= Id like my hat\	r7= I really like you\
c1= I want a T shirt\	r8= I love you\
c2= I want a sweater\	r9= Shut the hell up.\
c3= Ill wear a suit	s0= Whats youre name\
c4= Id like my pants\	s1= Where do you live\
c5= Long sleeved shirt\	s2= Where do you work?\
c6= I need a belt\	s3= How old are you?\
e1= Hanselint to eat\	s4= Do you like weather\
e2= Need mouthstick\	s5= What do you want don\
e3= Need my head stick\	s6= Can we go shopping\
e4= Need my long straw\	s7= May I borrow yours\
e5= Need suction cup\	s8= Want to go out?\

MARILYN: Speech and Motor Impairment

Marilyn, a middle-aged mother of five children, who gradually began to lose control of her muscles about eight years ago, died during the summer of 1985 as a result of a debilitating disease, amyotrophic lateral sclerosis (ALS). As she grew weaker, constant adaptations were required to compensate for her increasingly restricted mobility. When she was no longer able to speak or write, her son-in-law, with the help of Zygo Industries, developed a workable augmentative communication system for her. This is her story. It was taken from a collection of excerpts from letters Marilyn had written using her augmentative system during the nine months prior to her death.

"STARTING WITH A LIMP AND ENDING UP
HARDLY MOVING HAS BEEN A LITTLE TRAUMATIC.
I COULD HANDLE THE NOT WALKING O.K. BE-
CAUSE I HAD LOADS OF THINGS TO DO WITH MY
HANDS: POTTERY, WEAVING, AND READING
WERE A FEW OF THE MANY THINGS I ENJOYED.
WHEN MY ARMS GAVE OUT I USED A MOUTHESTICK
TO TURN PAGES. I DECIDED TO STUDY THE
STOCK MARKET. GRADUALLY, TALKING BECAME
DIFFICULT AND THAT WAS REALLY FRUSTRATING.

IT'S WONDERFUL TO BE ABLE TO COMMUN-
ICATE AGAIN. LIFE IS PRECIOUS NO MATTER
WHAT. I DON'T NEED TO BE OUT ON THE
STREETS RUNNING; THIS TIME, LIKE ANYTIME,
IS A GOOD TIME IF WE JUST KNOW WHAT TO DO
WITH IT. I WILL TRUST THE LORD TO JUST
LEAD ME. HE HAS PROVIDED ME WITH MUCH.
THANK THE LORD; I NOW CAN COMMUNICATE WITH
1 PRECIOUS FINGER.

Through the use of just that "one precious finger", Marilyn was able to control a communication system that enabled her to manage her entire household. Marilyn used several disks on which she stored various types of information. By entering a simple code she was able to retrieve, speak, and print out collections of recipes, household tasks, daily instructions for the housekeeper, notes to her family and neighbors and letters to members of her Bible study group. Marilyn operated her entire augmentative communication system with a single switch with one finger.

Marilyn prepared the following summary of her system for me:

Peg: The computer system you see before you helps one to speak, type letters and other documents, play games, access other computers, and do lots of other interesting things. It's made up of four parts. Let me explain.

The major element in the system is the Apple IIe personal computer. The Apple controls the other three parts of the system and runs all the programs that make the system go.

The small black and white box on the top of the Apple's screen is called the TETRA-scan. It allows the Apple keyboard to be operated from a single switch. Anything that

can be entered into the Apple from the keyboard can be entered from a switch attached to the TETRA-scan. But that's not all. The TETRA-scan contains a small computer that can be programmed, so that lots of data can be entered into the Apple with a minimum of switching.

The long thin white box on the side of the Apple is the third element of the system. It's called a Votrax speech synthesizer and turns text, sent to it from the Apple, into voice. It's really uncanny the way data entered into the Apple is converted into speech by the Votrax. By the way, the Votrax contains quite a powerful microprocessor as well; this relieves the Apple from doing all the work of converting text to speech.

The fourth and final part of the system is the Gemini eye printer. It's easy to send anything that's shown on the Apple's screen to the Gemini eye for printing. This includes notes, letters, grocery lists, and whatever else comes to mind.

Well, this is the end of the brief introduction to the system. I hope you are suitably impressed. Goodbye and good luck.



Pictured above is Marilyn's communication system.

Author's note: I was very impressed! Not just with her communication system, but with that lovely lady who so graciously shared her time and strength with me. As a result of Marilyn's joy at being able to effectively communicate while being physically incapacitated and her experiences using the augmentative system, her husband, Dr. Douglas Sorenson, continued to refine the system and has developed the Rescue Speech Systems. It is a single switch system, that will store up to 1500 words and 300 phrases (up to 200 characters long). The system can speak or spell and print out messages. Auditory scanning is also possible. It is user-programmable. His individualized system fits on a small cart on rollers so it can be moved around the house.
May, 1986, \$1500.

DAN: Motor Impairment

Dan is thirty years old. His spinal cord was injured as a result of a high school football accident. With the aid and support of his family, he graduated from the University of Minnesota with a law degree. One major problem he encountered in attending school was that all of his assignments had to be deciphered and typed by others, as it was impossible for him to operate a standard typewriter keyboard with his very limited range of arm motion. As a result, one of his fellow students designed a way for Dan to enter information into a computer by using an alternative keyboard. The Softkey System that Dan uses, interfaced with a Commodore 64 computer, gives him the opportunity to utilize the computer just as though he were using a standard keyboard.

The Softkey System is both hardware and software. Softkey utilizes a Koala Pad, a small graphics tablet, which allows Dan with his limited arm motion, to bypass the Commodore 64 keyboard and enter data/commands directly into his computer by using a stylus or pointer. The Koala Pad is only 2" X 5" in size and compensates for Dan's restricted arm motion. The system also gives him an auditory feedback control that enables him to monitor data input and/or command changes. Another feature of Dan's system is that it allows him to have access to commercially available software.

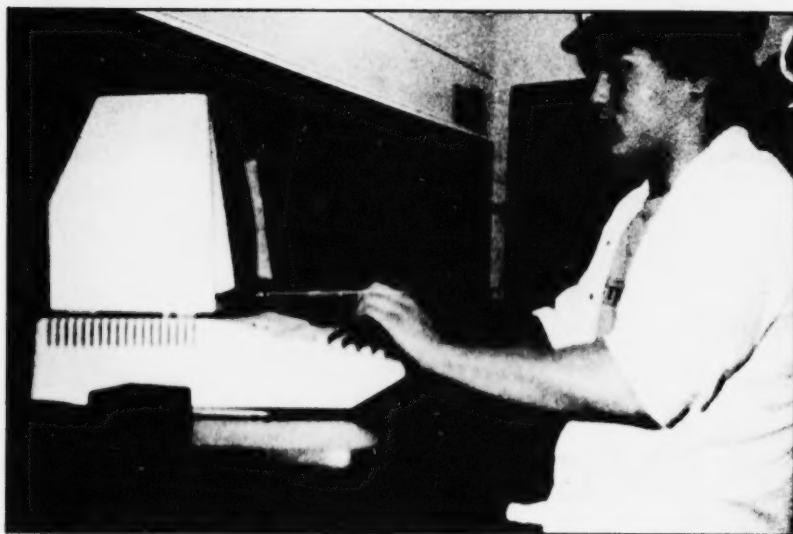


Dan entering information into his system by inserting a stylus into the appropriate guide hole in the Koala Pad keyboard.

MARC: Hearing Impairment

Teenager Marc Hagen has been hearing impaired since early infancy. He is one of seven children of Bud and Dolores Hagen, who are nationally recognized as the founders of Closing The Gap, a leading source for information and training on computer technology for handicapped persons. Marc is able to read lips so he can communicate with his family and friends without much trouble, but he has a bit more difficulty talking with strangers. In junior high he was exposed to many new vocabulary words which seemed foreign to him. He could not understand another person's lips if he did not know the word beforehand. The teachers' lectures had become increasingly more difficult for him to understand. His interest in school started to wane until his folks analyzed Marc's problem and created a solution. To help him increase his language skills, which were lagging, his mother designed a system using an Apple II microcomputer in conjunction with a software authoring program known as E-Z Pilot. This system allowed her to develop drill and practice exercises of increasing difficulty, using vocabulary words pertinent to each particular lesson.

His mother spent forty minutes each day writing out the daily assignments from the teachers' manuals so that Marc was able to review them before he went to class. By reviewing the words before class, he had a better chance of understanding the vocabulary that was presented in class that day. Marc uses an Apple II microcomputer at home for his drill and practice exercises and takes a TRS-80 Model 100, portable computer, with him to school. With the TRS-80, he is able to take his own class notes by using its word processing unit. When Marc is not able to understand his teachers or fellow students by lip reading, they type messages on the TRS-80 so Marc can read them from the computer screen.



Marc inputting data into the microcomputer

After one year of using a microcomputer, both at home and in school, Marc was asked to write a story about microcomputers and how he felt about using them in school. Here is his story, printed with permission from his mother's book, *Microcomputer Resource Book For Special Education*.

"My name is Marcus Hagen and I am 13 years old. Last year I was in the 7th grade at Belle Plaine Junior High, in Belle Plaine, Minnesota.

The seventh grade was very hard for me in social studies and science. I could not understand the books and sometimes I could not lip read the teacher. It was so bad that I did not want to go to school at all.

My mother learned about computers and asked the school to try Computer Assisted Instruction for me. They said yes, so my mother started writing programs for me to use at school.

Things got better right away. The computer helps me learn new words and meanings.

I used the computer at least 2 hours a day at school. I am learning to type with a computer typing tutor and I am writing this story with a word processing system. My mother is writing courseware in science and geography for next year for me and other eighth graders.

I like computers because they help me learn. I wish all handicapped people could use computers because if they could, it would make life easier for them.

You can use a microcomputer to learn, for typing, for word processing, for games or just about anything. You can even use it as a TDD (telecommunication device for the deaf) now that the telephone company said it is okay to use the microcomputer as a telecommunication device for the deaf.

Sometimes it is hard for me to understand the teachers because they talk very fast. When they talk fast they asked me, "what does that word mean." I said it all wrong. I felt so embarrassed because my class laughed at me. When I use the computer, the class didn't laugh. The computer does not make fun of me, it just teaches me."

STEVE: Visual Impairment

Steve is thirty-one years old and has been blind since 1977, as a result of complications of diabetes. He was married in 1979, and has one child. Steve has worked as a massage therapist at the YMCA for eight years, owns his own home and supports his family.

For several years, he used a standard typewriter for all his business and personal correspondence and used cassette tapes to store his

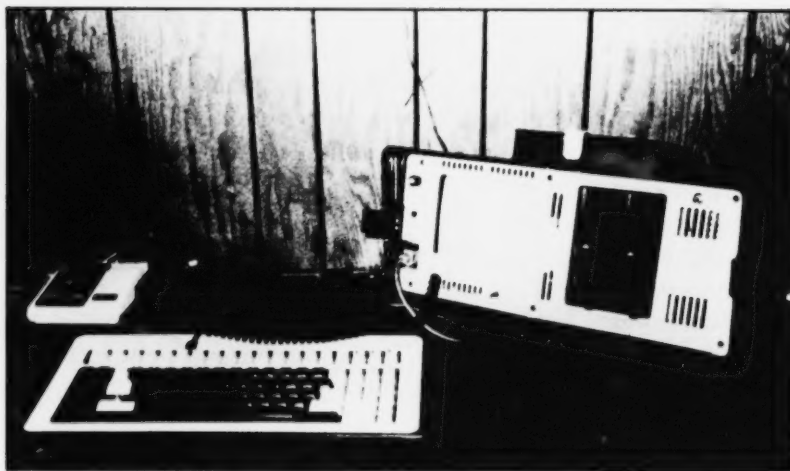
business information and records. To increase his efficiency and accuracy he investigated the possibility of developing an augmentative communication system. In March of 1983, Steve purchased his first system and it worked so well for him that he upgraded his system even further a year later. He now feels that he has the ideal system for his needs and disabilities.



Steve's First Communication System.

Steve's first communication system consisted of an Osborne 1 computer, an Echo GP Speech Synthesizer, and AVOS software. The Echo provided verbal feedback as information from the keyboard was entered into the computer. He did not have any trouble understanding the robotic voice of the Echo and only needed the spelling function if he could not understand a specific word. Steve preferred a particular talking program which is designed and manufactured by AVOS. However, the three aids were not compatible with each other and special codes had to be obtained for the Osborne 1 to enable all the units to function as a system.

Steve now uses a Zorba Z-80 microcomputer which is a portable 22 pound unit with 64K of memory and AVOS software that permits him to take advantage of his Echo GP speech synthesizer, thus assuring him of the accuracy of his input.



Steve's Ideal System.

AVOS offers an integrated hardware and software system that takes advantage of the Echo GP speech synthesizer, to assist visually impaired individuals to do word processing, document formatting, information management, checkbook management, and directory filing.

Steve has found that by using an augmentative communication system he can more efficiently and effectively maintain the relationships and records essential to his business.

BLISSYMBOLICS: Speech and Motor Impairment

Blissymbolics is a meaning-based symbolic communication system. It was designed for the severely disabled person who cannot read, write, or spell out words. There are over 1,400 Bliss symbols or pictures representing nouns, adjectives, verbs, and phrases. Each word has been assigned its own unique 3-digit number code. Prior to computers, most people with severe motor impairments used a transparent screen with the numbers 0 to 9 placed on it. The user would position this transparent screen between himself and the person he was communicating with. By focusing his eyes on individual numbers, he was able to express his wants and needs. The listener would then repeat the number selected by the user to insure accuracy and then find the corresponding number on the Bliss symbol chart to understand the

message. The introduction of microcomputers with voice synthesizers has given disabled users of Bliss symbols a more efficient and less time-consuming method of augmentative communication.

Florence Wertz has done extensive research on the use of Blissymbolics as learning and communication tools for use of the disabled. In collaboration with MECC (Minnesota Educational Computing Corporation), she designed a software program to meet the needs of her students. This program provides the option of displaying the Blissymbol together with the corresponding word, the Blissymbol alone, or the word alone. Ms. Wertz used this system to teach her students sentence structure. Various Blissymbolic software programs are now available for use with the Apple II microcomputer.



Florence Wertz, former speech pathologist at Michael Dowling School for Crippled Children displays a Bliss program developed for the Apple II microcomputer.

One of the most valuable aspects of the available Blissymbol display programs is the ability to print out symbol sequences with the English word appearing above the symbol. Printed below is an example of a Blissymbol printout from a Paper Tiger printer. Its large type face is an advantage for instructional use for persons with limited vision.

next month (to) April 1st
 V ^
 1. | D O D 4 1
 (to) harm
 be: e: 1st V
 A <> I

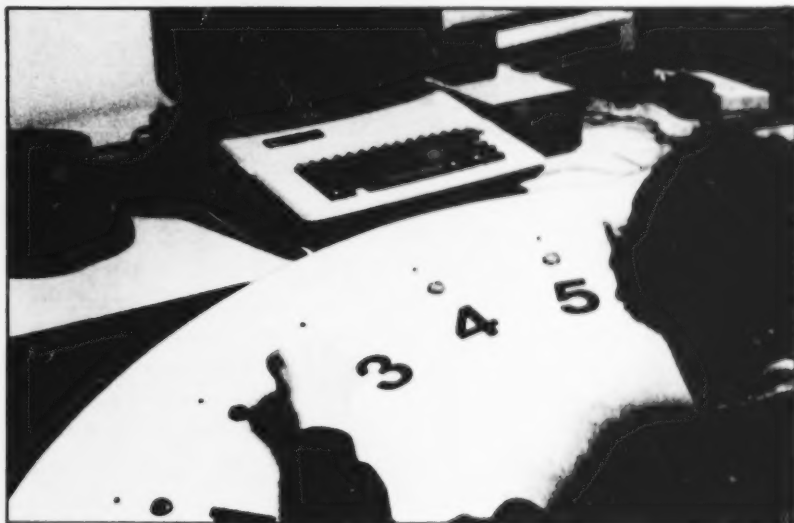
Light Sensitive Methods For Computer Access Using Blissymbolics

Frank Kurkowski, an occupational therapist at Humboldt Jr. High School in St. Paul, has designed two light sensitive adaptations using Blissymbolics to access an Apple microcomputer. These adaptations provide severely motor impaired students with a method of entering information into a computer using their traditional Bliss symbols and with a way to communicate verbally with a voice output system.



Pictured above is Brian, a student at Humboldt Jr. High, accessing a computer by using a light sensitive board with numbers ranging from 0 to 9.

Accompanying each number is a light activated photocell. Attached to Brian's headband is a light source which he focuses on these individual numbers (photocells) for a few seconds which enters a selected Bliss code into the Apple Computer. The system uses a Bliss vocabulary software program containing about 500 words. Brian has the option of constructing phrases, sentences and paragraphs which can be viewed on the computer screen, spoken by the speech synthesizer, or printed out on paper.



Pictured above is Amy, a student at Humboldt High School, using a different light sensitive application to access the computer.

In her case it is the absence of light on the photocells which are numbered from 0 to 9, that allows her to enter information into the computer. By passing her fist over a selected numbered photocell, it blocks the light from entering and sends this signal to the computer. The result is exactly the same as if Amy had inputted the information from the computer keyboard. The system also allows a two-second time delay to prevent accidental triggering.

These two augmentative communication systems at Humboldt Jr. High are also used by the speech therapist to teach language skills and development.

SUMMARY

It may sound simple. Select a communication aid, plug it in or put in the batteries, and start communicating. Unfortunately, it's not that easy. Learning to use these new technologies for the first time can be a slow process and often requires considerable persistence and practice.

While no piece of hardware, regardless of its price or sophistication, will permit a user to totally overcome his or her disability(s), it is apparent from these applications that communication aids have the potential to greatly enhance a user's capabilities and enrich their lives.

Marilyn Sorenson expressed the joy of communicating so beautifully when she wrote: "Thank the Lord; I now can communicate with one precious finger."

PART III

SELECTION

"The single most important guiding principle in selecting communication aids must be this: Any communication device can only augment, not replace, one's own ability to communicate."

Peg L. Johnson

SELECTING AUGMENTATIVE COMMUNICATION AIDS

The world of augmentative communication is becoming increasingly complex. In the last few years, we have come from a position of having relatively few electronic communication aids from which to choose, to one of a wide range of choices, each offering a different set of advantages and disadvantages. The technology has accelerated so rapidly in just the past two years, that many people are unaware of the availability and capabilities of the new state-of-the-art devices. With these new devices, it is now possible to raise our sights about what we should expect in a communication aid.

These new innovations, while excellent news from the standpoint of an individual who is communication disabled, present a real challenge to the professionals who must assist prospective users in selecting the most appropriate aid. The task of keeping abreast of all these new technological advances is becoming more and more time consuming. For the person who is receiving a first exposure to the field of augmentative communication aids, the number of available options may seem overwhelming.

The purpose of this section is to share with the reader many of the specific ideas and suggestions that were contributed by professionals and disabled users, who have been involved with the selection process.

WHERE TO START

Professional help is nearly always essential in selecting an augmentative communication aid. In the event a disabled user does not know who to contact for professional help, a good place to start is with a social service organization, society, or federation that was established for the express purpose of aiding those persons with a specific disability; such as cerebral palsy, blindness, hearing impairments, muscular dystrophy, multiple sclerosis, cancer, amyotrophic lateral sclerosis, to name a few. These organizations may or may not be in a position to provide direct assistance in evaluation, testing or funding, but are often valuable sources of information, and may provide referrals to qualified professionals or rehabilitation centers who are familiar with communication disabilities, and electronic communication devices. In the Midwest evaluations are available to some individuals at centers located at: the Mayo Clinic, in Rochester,

Minnesota; Courage Center's Communication Resource Center in Golden Valley, Minnesota; ACCESS (Augmentative Communication and Controls Evaluation Services) at Gillette Children's Hospital in St. Paul, Minnesota; TRACE Research and Development Center for the Severely Communicatively Handicapped in Madison, Wisconsin; and the NACE (Non-verbal Augmentative Communication Evaluation) Center in the Crippled Children's Hospital and School in Sioux Falls, South Dakota.

This professional assistance is necessary in order to obtain a comprehensive assessment/evaluation of an individual's limitations, capabilities, and communication needs. Multidisciplinary assessments/evaluations are especially recommended for individuals who have serious or multiple impairments, as they have much greater variations in limitations and individual needs. When possible such an evaluation should include input from appropriate members of a team, consisting of a speech-language pathologist, occupational therapist, physical therapist, special education teacher and a rehabilitation engineer. A professional assessment/evaluation is a vital step in acquiring all the information essential to selecting and adapting an appropriate communication device. They are also essential if an individual expects to obtain third-party funding for a communication aid. (Described in detail in PART V, FUNDING).

Selecting an augmentative communication device is not like buying a television set, where most makes and models give a reasonably good picture and sound. On the contrary, when selecting and purchasing a communication device, one is making an investment in a disabled individual's future, and will want to assure that the most appropriate device is selected. With the wide variety of hi-tech communication devices on the market that have practically unlimited capabilities, it will save considerable time and effort for everyone involved if the assesment/evaluation is completed prior to "shopping" for a device. As an example, manufacturer's representatives have related how difficult it is to make an appropriate recommendation without a professional assessment/evaluation to use as a guideline. They are sometimes asked by family members, foster parents, or representatives from group homes, etc., to prescribe devices on the basis of a brief observation of the user, or being told about an individual's communication difficulties. As one manufacturer's representative said, "This isn't right. I haven't been trained to do this."

CHECKLISTS

Dave Garwick, a consultant to the Special Education Service Center in the Minneapolis Public School System, provided the following example of a checklist of questions that were designed to help an evaluator identify a prospective user's need for a communication device, the degree to which it will be used, the limitations imposed by the disability, and the particular functions required in the device. This **Checklist of Questions To Ask**, is designed to actively involve the prospective user in the selection process. It also eliminates wasting time on inappropriate options and reduces the possibility of overlooking items that may be important two or three years down the road.

1. Exactly what do you want the device to do?
 - telephone communication?
 - classroom participation?
 - classroom notetaking?
 - meet personal daily needs?
 - emergency communication?
 - moment-to-moment social communication?
 - written academic requirements?
 - specific job communication requirements?
 - other? (List)
2. Can the individual use symbolic means to get the point across?
3. Does the individual have particular disabilities limiting the options?
 - inability to read and spell?
 - severe hand/finger dexterity problems?
 - severe visual acuity/perceptual problems?
4. Does the system need particular capabilities?
 - visual display?
 - electronic speech production?
 - hard copy print out?
 - electronic output capability?
 - walker portability?
 - switch capability? (Type?)
 - use of a particular symbol system?

- programmability?
- scanning/encoding capability?
- telecommunication capability?

5. Environmental characteristics?

- dominant communication style/mode?
- ability to support a given option?

Checklists, in addition to helping the evaluator obtain the specific information needed to evaluate various communication devices, are a major benefit to the prospective user. A complaint often heard from communication disabled individuals is that "someone thought they knew what was BEST for me and wouldn't take the time to LISTEN to my ideas." It is difficult and time consuming to listen, but that someone can never feel the frustration and anxiety of communication disabled individuals who want to participate in decisions that affect their future well-being. Because that someone didn't listen, some disabled individuals are using communication devices that are inappropriate and are below their cognitive, language and educational skills. This is most unfortunate, as it limits their opportunities for growth and development. Perhaps, with today's sophisticated devices, more people will feel the need to get communication disabled individuals involved in the selection process. Check lists are excellent vehicles for this interaction.

FACTORS TO CONSIDER WHEN EVALUATING COMMUNICATION AIDS

Once the evaluator has determined the limitations, capabilities, and requirements of the prospective user, the next step is to evaluate the advantages and disadvantages of the various augmentative communication aids and select the aid that will be the most effective and least restrictive. This is no easy task as there are no simple formulas to follow. The ever increasing number and variety of new hi-tech devices makes it extremely difficult to select the most appropriate device, based solely on past experience, or product literature, or a one-time demonstration, or the testimonial of a satisfied user with a similar disability. The cost of sophisticated communication aids prohibits professionals and rehabilitation centers from purchasing one of each to use in client assessments and evaluations. However, there are a few

systems available that were designed to simulate a wide variety of communication aids that use various input methods. (See PART IV). Since these systems are relatively new, they are not generally in use in the field. After the assessment/evaluation, it is desirable to obtain professional technical assistance regarding augmentative aids from various manufacturers or their representatives. They are generally the best source of this type of information. Unfortunately, a large number of people are unaware of just how many devices are actually available today and who to contact for this information. (See PART IV).

In the final analysis, the cognitive, language and educational skills of the user, the type of output needed, and the ability of the user to activate the device, will narrow the possible selections to a few appropriate devices. Then other factors must be considered.

Walt Woltosz, President of Words+, and a former Aerospace Engineer for United Technologies Corporation, has published a pamphlet entitled, *What's Important In An Augmentative Communication Aid*. This publication is based on his six years of experience in developing and designing electronic communication aids for individuals with various communication disabilities. Many of the following suggestions were taken from Mr. Woltosz's publication, with his permission.

The following factors are important considerations in the selection of a communication device for a particular individual. When thoughtful consideration is given to each of these factors, it will help to assure that the most appropriate device is selected. These factors are also a good starting point for discussions with manufacturers' representatives and provide a basis for comparing advantages and disadvantages of various devices.

Communication Speed	Flexibility and Growth
Independent Operation	Feedback Characteristics
Input Methods	Portability
Types of Output	Cost
Language Characteristics	Service and Support

Communication Speed:

The speed at which the user communicates is unquestionably the most important single characteristic governing the effectiveness of their communication. Many listeners are impatient and not willing to

really interact if the speed of the communication is slow. Also, when time and energy are focused on operating a communication device, they are not available for anything else. For example, consider a person with a limited communication device who needs 8 hours (all day) to write a letter, and another person with a state-of-the-art device who needs only 1 hour. The second person is able to move on to other activities. In a very short period of time, the second person will have learned, developed, and accomplished more than the first.

Devices are available with advanced acceleration techniques that enable the user to achieve many times the speed of simpler systems. Advanced techniques include Abbreviation Expansion, "Instant Speech", rapid access to frequently-used words, phrases, or sentences (stored vocabulary), and most recently, word prediction. Communication speed enhancements can make the difference between extremely slow communication at 2-3 words per minute and the ability to communicate at as much as 15-20 words per minute for a single-switch user, and higher speeds for users with the ability to use multiple switches, full keyboards, or other input methods. Augmentative communication devices are slow at best, so it is essential that a user select the device that allows him the fastest and most efficient form of communication possible.

Independent Operation:

The first-time user of an augmentative communication device is often someone who has had no previous experience with computer-type electronic devices. Learning to use these new devices can be a frustrating and slow process that requires considerable persistence and practice. However, if the device is appropriate the user should be able to learn to use it more quickly and should be able to do as many different things as one's capabilities permit. The level of effort required to operate the device (physical, visual, cognitive) should be within the capabilities of the user. This will maximize the degree to which a user achieves independent operation and will reduce the interpretive role of a third-party. Independent operation, in addition to providing a means of self-expression, also has the potential to assist the user in developing new skills that were previously thought to be unattainable.

Input Methods:

Today's technology allows even the most severely physically disabled individual to operate some type of augmentative device. Input methods are now available that range from variations of the standard keyboard to various types of switches that can be operated by an individual who is capable of only a single, consistent, voluntary action, as slight as an eye blink. When evaluating augmentative devices for a particular individual, the type of input method under consideration must enable the user to achieve independent operation and maximize communication speed. Communication devices are generally categorized according to the method of input that is required to operate them. For example, direct selection, scanning, and either direct selection or scanning. (Discussed in PART IV).

Types of Output:

The types of output available, depending on the device, may include visual display, printed copy, audio (voice/sounds), electronic, tactile, and environmental control outputs. If voice is required, it is essential that the user hear the voice quality to determine if it is acceptable. A demonstration is best.

Language Characteristics:

The language characteristics of the device must make optimal use of the language abilities of the user. A person without reading and spelling skills will need either a pictorial symbol-oriented system or a code-oriented language system (code here refers not to Morse code, but to some simpler sequence of selections, such as pressing a switch a certain number of times). An individual with good (at least 3rd-4th grade level) reading and spelling skills will normally do better with traditional orthography (printed letters, words, phrases, and sentences), or perhaps with a system that uses a combination of pictorial symbols with traditional orthography if reading and spelling skills are minimal. Often, persons with good reading skills but poorer spelling skills can make use of a stored vocabulary system which allows them to select complete words (without the requirement to spell them) more effectively than systems that require spelling of words.

Flexibility and Growth:

Flexibility and growth capabilities are important factors to consider because of changes that occur in:

- *The abilities and needs of the user.* Physical abilities can improve with rehabilitation or deteriorate as with progressive neurological disorders or aging; and cognitive, language and educational skills can also change.
- *The state-of-the-art of augmentative communication.* Some devices are pretty well fixed when they are delivered, while others have the ability to rapidly and inexpensively change their characteristics, to add new features and capabilities, or to be upgraded as technology continues to advance.

The device must be able to accommodate these changes. Otherwise, a new device will be needed or the person's potential for achievement will be limited.

Feedback Characteristics:

The user of an augmentative communication device depends on feedback from the device to know what can be selected and what has been selected. Feedback consists of visual, auditory, and/or tactile cues for the user (as opposed to output, which is also for the communication partner).

Visual Feedback — The person using an augmentative communication device must be able to comfortably see any visual cues required in the operation of the system. The size of characters/symbols must be sufficient to allow the user to comfortably identify selected items at the distances to be used during device operation.

Auditory Feedback — The audio feedback characteristics of the device include such items as an auditory click or beep when a selection is made, audio cues to assist visual cues when scanning, audio feedback of Morse codes, and voice audio feedback of selected items and commands, or for review of created text. If audio feedback is used, it must be loud enough for the user to hear in all required operating environments, but must not be obtrusive to others any more than is absolutely necessary. The ability to turn audio feedback on and off, or to adjust its volume, may be

important in some cases. If voice audio feedback is used, it must of course be intelligible by the user.

Tactile Feedback — Tactile feedback generally consists of a feeling of movement of keys that are pressed, the texture of the surface on different keys or switches, or, in some new advanced systems for the visually impaired, in rows of small plastic pins that form bumps that can be used as braille or other codes.

Portability:

Portable devices provide the user with a means of communicating on the move, an important consideration for those who do not remain within a limited area. When looking at portability, several characteristics are important, including size, weight, and battery life.

For an ambulatory user, the device must be lightweight and compact enough for the user to transport in some convenient manner. A user in a wheelchair is less affected by size and weight, as the chair will carry the load.

Battery life is an important consideration in portable devices. As a minimum, batteries should provide sufficient life to operate for the maximum amount of time that the user will normally be expected to be away from AC power. Preferably, the device should operate a full day without recharging, or there should be a quick way to switch to a spare battery if needed. If the user is in a power wheelchair, the power from one of the 12-volt batteries on the chair can often be tapped for use by the augmentative communication device without a significant effect on the chair.

Cost:

The wide variety of electronic communication devices that are available vary significantly in function, design, and cost. Some devices are available for as little as \$200, but sophisticated electronic aids generally cost between \$2000 and \$6000. Depending on the limitations and capabilities of the user, there may be cases where a \$200 device may be more appropriate than a more sophisticated device. What is important is that the device makes use of every bit of ability the user has, since his level of personal achievement is closely related to his ability to communicate at the highest possible functional level.

Augmentative communication devices should never be procured solely on the basis of cost alone. A communication disabled individual's future is determined to a large degree by the effectiveness of an appropriate device. The greater the effectiveness . . . the greater the opportunity for an individual to gain the self-confidence needed to actively participate in all aspects of life-at home-at work-and-at play.

Service and Support:

The user of an electronic communication aid will become increasingly dependent on the aid in day-to-day living, because it will provide such a great improvement in the quality of life. This is just as true for users with very limited capabilities, who are using the most basic electronic devices, as it is for those capable of operating the more complex computerized devices.

Eventually, these electronic devices will need service. However, advances in electronics and computer technology have helped to increase the reliability of aids over those of just a few years ago; but the need for service and support is still there, and it is important. If and when the aid requires service, it should be available in a timely manner, so that the amount of down time for the user is minimized. Fortunately, modern shipping (such as UPS, Second Day Air, or even Next Day Air) is relatively inexpensive, so transportation time back to the manufacturer is no longer the problem it once was. The manufacturer must be equipped to perform the required service and return the device quickly.

Depending on the complexity of the device, it is also essential that the manufacturer or local distributor be available to answer questions over the phone and assist when necessary to resolve any problems that may arise.

* * *

After considering the ten preceding factors, it is a good idea to review the following questions with the manufacturer's representative and receive satisfactory answers before making the final purchase decision.

1. Does the manufacturer provide training in how to use the device?

2. Has the manufacturer previously sold a similar device in this area? To whom? A phone call to a user takes little time and may answer numerous questions regarding the effectiveness of a particular device.
3. If a standard factory device is not appropriate for a particular individual without modifications, will the factory provide these custom modifications in order to meet the needs of the user? Is there a charge for this service? If so, how much?
4. What is the warranty period? Terms of sale?
5. Is rental or loan possible for an evaluation period?

Unless there is no question as to the appropriateness of a particular device, it is recommended that a prospective user secure a rental or loaner and try it out before making a decision. Some manufacturers have recognized the need for a trial period, and have incorporated a stated rental policy into the marketing of their products or offer a full refund if the user is not satisfied after a specified time period. United Cerebral Palsy of Minnesota (UCPM) has addressed this need on a limited basis with the establishment of a UCPM loan bank. They have a limited number of electronic communication devices available for loan to professionals working with this population, in order to provide an extended period of time in which to test whether a specific device is appropriate in a particular situation.

It's just good business for the professional evaluator, the user, and the manufacturer's representative to make certain the device is appropriate and effectively meets the needs for which it was purchased.

SELECTION IS NOT AN END IN ITSELF

While the initial selection process is extremely important, it is not an end in itself. Over time an individual's capabilities change, cognitive skills change, physical abilities change and educational skills change. Periodically, a reevaluation of the individual, in conjunction with the device, must be made to either: substantiate the initial selection decision, upgrade the device or, in the case of debilitating diseases, to make any required adaptations necessary to keep the device functional. Otherwise an individual's opportunity for growth and development may be seriously limited, or they will not be able to maintain their maximum level of communication.

PART IV

AUGMENTATIVE COMMUNICATION AIDS

"I know no other handicap as great or having as great an effect on a person's psychological, sociological development as being unable to speak. The person who can't speak is a person who is ignored. A person who is ignored is a person who is stunted in his development. For 24 years my thoughts and ideas were held prisoner in a cell, which was my body. I was isolated from all others."

Rick Creech



RICK CREECH, THE GRADUATE

May, 1985, marked Rick's graduation from East Carolina University, in Greenville, North Carolina. He graduated Magna Cum Laude, was in the top one per cent of his class and was chosen Male Senior of the Year by East Carolina University's chapter of Phi Kappa Phi, National Honor Society. In addition, he received a full fellowship from Phi Kappa Phi to attend graduate school. Rick's East Carolina University fraternity Phi Sigma Pi, named an award the "Rick Creech Service Award" in his honor. Rick's plans are to pursue his master's degree in psychology, with a specialization in the psychology of the disabled. Rick says he is "not only interested in the psychology of the disabled but also in the psychology of the able-bodied toward disabilities. There is a wide gap of ignorance between the ableds and the disableds, and I'd like to build a bridge between the two groups."

Photo courtesy of Prentice Romich Company

STATIONARY COMMUNICATION SYSTEMS

If a user is considering a communication system that incorporates several electronic devices and involves a stationary microcomputer and software, there are so many factors that must be considered that securing qualified professional assistance is highly recommended. One of the major factors that must be considered is whether or not the various components to be used in the system are compatible with each other. Compatible means that the various components will work together as a unit to achieve the desired result. As an example, the Zorba Z-80 microcomputer used by Steve (See Practical Applications, PART II) is compatible with the AVOS software he uses and, both are compatible with his Echo GP speech synthesizer to give him the output he needs and expects from his system. It is the software program that operates a microcomputer system and a potential user can select the software that meets his or her needs (word processing, accounting, graphics, education, games, etc.) and then select the hardware that is compatible with it, such as the microcomputer, printer, speech synthesizer, etc., or do just the reverse. The same compatibility problems also apply to the adapted equipment often needed by individuals who are motor impaired and unable to use a standard keyboard. If adaptations are required, professional expertise is generally needed to determine the most efficient and effective method to access the computer and to make any necessary modifications. The microcomputer field is bedeviled with these compatibility problems because at the present time there is no standardized system for linking needed interconnecting devices and adapted equipment to other devices manufactured by different companies. Compatibility problems and required adaptations often seriously reduce the number of options that are available.

Another problem associated with most stationary microcomputer systems is that they operate on standard household electrical current, and are generally bulky and heavy. This tends to limit their use to a particular environment. While they are very effective and appropriate in a school setting, in the workplace or at home, the user loses this communication support whenever he or she leaves that environment. Therefore serious consideration must be given to whether a stationary system or a portable device best meets the needs and lifestyle of the prospective user.

With the vast amount of product literature readily available on a wide range of stationary microcomputers, printers, and software, a review of these products has been omitted from this book. As an example, the 1985 *Minneapolis Yellow Pages* contained sixteen pages of the names, addresses, and telephone numbers of suppliers marketing these products. Peter A. McWilliams in his book *Personal Computers and the Disabled*, devoted 130 pages to over 60 models and brands of microcomputers and printers, and *Closing the Gap 1986 Resource Directory* includes complete descriptions of software programs that have characteristics especially suited for persons with disabilities. So it is not too difficult to obtain specific information on these products.

PORTABLE COMMUNICATION DEVICES

The focus of this section is to provide a general overview of the types of portable communication devices available today, that are specifically designed to meet the needs of the various segments of the disabled population. This limited and fragmented market makes it difficult and costly for manufacturers to develop an awareness of their products. Consequently, it is difficult for professionals and prospective users to obtain information on what is available, and who to contact to obtain this information. A survey of service providers to the disabled, taken by the Foundation for Better Hearing and Speech in cooperation with United Cerebral Palsy of Minnesota, found that 66 percent of the respondents said, "A major problem in the use of augmentative communication was the lack of knowledge, regarding the availability and appropriate use of communication systems." Since that survey was taken there have been significant increases in the availability of new devices, but obtaining information about them and their appropriate use continues to be a problem.

This section includes an up-to-date review and pictures of various types of portable communication devices. A few devices were omitted because the manufacturer did not respond to a request for product information or a photograph. They are grouped according to type of disability or method of input, recognizing that there are no universally accepted definitions for direct selection, scanning, and either direct selection or scanning. This review provides a general source of information and a starting point from which to make comparisons of

available features, such as: type of input, forms of output, functions, number of keys, program capabilities, weight and size, and the general price range. Persons having an interest in any of these communication aids can write the supplier and obtain additional information and the name of the local representative. (Addresses given in PART VII).

A wall chart entitled *Features of Commercially Available Communication Devices* was developed by Arlene Kraat and Marsha Sitver-Kogut, Augmentative Communication Program, Speech and Hearing Center, at Queens College. It was published in February, 1985, and since that time a few new high-tech devices have become commercially available, but it is still an excellent source of information. The research was funded by Prentke Romich Company, Phonic Ear Inc., Don Johnston Development Equipment, and Words+, Inc. A copy of the chart is available from any of these companies at a nominal fee.

Many of the portable electronic aids that are available are self-contained units, relatively small in size, and weigh only 2 to 10 pounds. Since they are light weight and battery operated they can be carried with a shoulder strap much like a camera, or adapted for a wheelchair. This feature substantially increases the mobility of the user and enables the device to be used in a variety of settings — for example, in the classroom, in the workplace, on the bus, at social events, and for daily activities. Lest anyone think, because these devices are small and battery-operated, that they are toys, they will be interested in what Walt Woltosz, President of Words+, Inc., has written. "During the last few years, battery-powered computers have increased in capability while decreasing in cost to the point where several suitable portable computers are now available for use as augmentative communication systems. In fact, we can now put the power of an IBM PC on a wheelchair and it can be operated with as little as a single switch! It seems safe to assume that these systems are the definite trend for the future, as they offer tremendous capabilities now, with nearly unlimited growth for the future."

The information regarding the various communication aids included in this section were taken at face value from comments by professionals, disabled users, manufacturer's representatives and from the manufacturers' product brochures. This information should not be construed as an endorsement of the quality, reliability, or effectiveness of any particular product, and is not intended to represent a complete technical review or advertisement.

Since prices may vary by time and area and with added accessories and adaptations, the following price range codes may be helpful.

PRICE RANGE	CODE
Under \$750	A
\$750-\$2000	B
\$2000-\$4000	C
\$4000 and up	D

Exact quotes may be obtained by writing or calling the manufacturer or distributor.

The "best" augmentative communication aid available in this section is the one which most closely matches the disabled user's capabilities, needs and future expectations.

DEVICES USING DIRECT SELECTION FOR INPUT

Direct selection: A selection made by pointing at a desired location (letter, number, symbol, etc.) and activating the device by a physical action using hands or fingers, toes, mouthstick, manual or optical headpointers, eye-gaze, etc. With direct selection the user has the option of selecting an item at their convenience, without regard to a time demand.

Direct Selection Devices

ALL TALK

ACS SpeechPac

ACS SpeechPac with Photo Board and Light Pointer

ACS SpeechPac with Unicorn Board

Canon Communicator M

Small Talk

Vois 130

Vois 135

Vois 140

Touch Talker (Minspeak Version)

EyeTyper Model 200

Special Friend Speech Prosthesis

Speak N' Spell

Vocaid

Words+ Portable Voice II (Keyboard Version)

Words+ Portable Voice II (Expanded Keyboard Version)

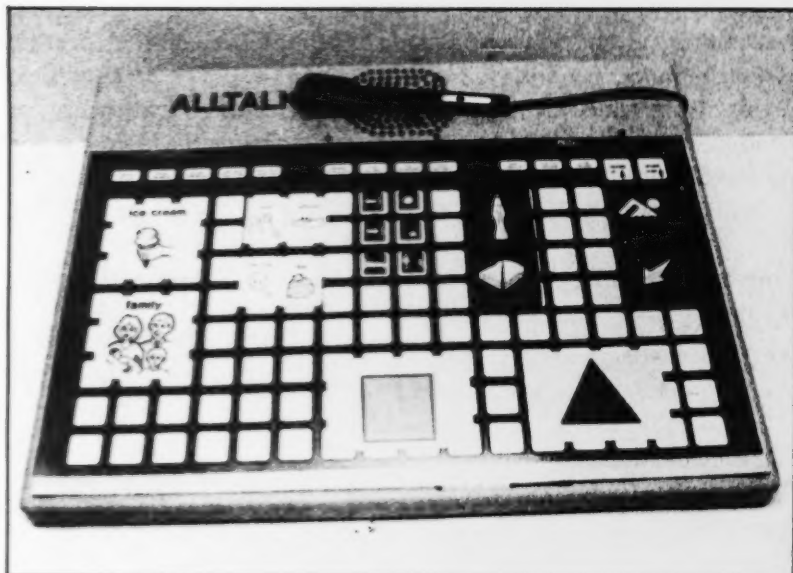
Words+ Portable Voice II (Morse Code Version)

Lightwriter

ZYGO Notebook

These devices are described on the following pages. Contact the company for more complete information.

ALLTALK



Adaptive Communication System Inc.

Forms of Output:

Actual human voice and programmed sounds.

Functions:

Recall of pre-recorded voice, music, or other desired sounds.

Number of Squares:

Can contain up to 128 programmable locations that are adjustable to meet the needs of the user, (1" X 1" or 2" X 2" or 4" X 4"). The touch sensitive membrane squares can be activated by finger, mouthstick, or headpointer.

Programming Capabilities:

Designed to be completely programmed by user by recording desired voice, music, etc., into memory with use of a microphone. Standard memory capacity about 550 words with optional memory expansion to 1100 words. Most Picture Overlay Kits can be adapted to the Alltalk Communicator.

Approx. Weight and Size:

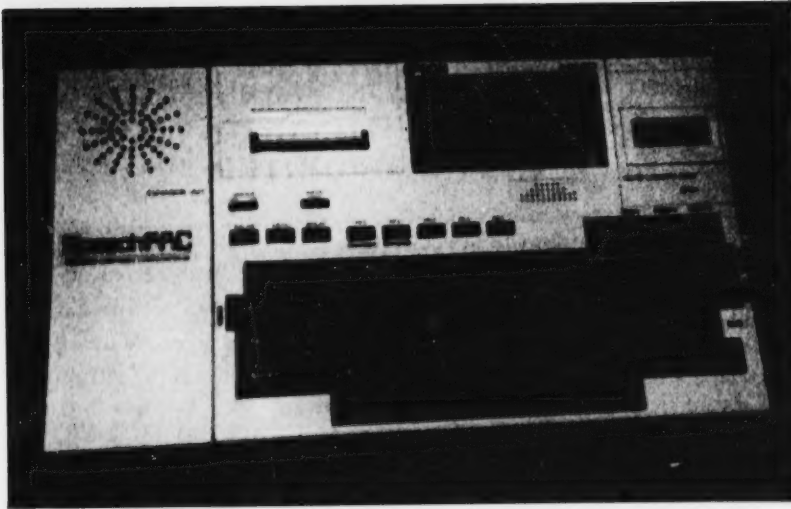
10 lbs. 16" X 20" X 2"

Price Range:

D

53

ACS SPEECHPAC



Adaptive Communication System Inc.

Forms of Output:

Synthesized voice, 4-line 20 character/line display screen, and a column printer.

Functions:

Recall of user preprogrammed words/phrases. May be used to access an Apple II+, IIe, or an IBM PC computer.

Number of Keys:

Standard typewriter keyboard plus special operation keys. Keyguard cover available. Expanded membrane board is also available.

Programming Capabilities:

Designed to be completely programmed by the user. The memory capacity is approximately 18,500 characters. Additional programs may be stored on microcassette tapes. Incorporates Logical Letter Coding to represent sentences, phrases or words.

Approx. Weight and Size:

5 lbs. 9" X 15" X 2"

Price Range:

C

50

The following two devices incorporate the features of the ACS SpeechPac but were designed to meet the needs of individuals without standard keyboard skills.

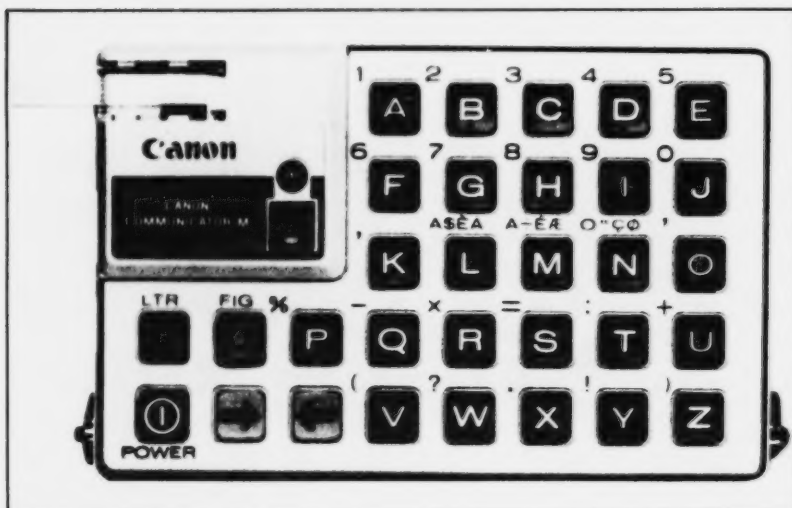
ACS SPEECHPAC WITH PHOTO BOARD AND LIGHT POINTER

This device includes the SpeechPac and features an adaptable light board that contains LED lights and photocells. It is activated by a lightpointer directed at the selected photocell. It incorporates Logical Letter Coding that allows the user to recall messages of up to 250 characters by entering 1, 2, or 3 keystrokes. Additional programs may be stored on microcassette tapes. Price Range: D

ACS SPEECHPAC WITH UNICORN BOARD

A SpeechPac with an expanded keyboard containing up to 128 programmable locations that can be used with various sizes of alphabet, pictures or symbols. Can store up to 15 different programs plus additional programs on microcassette tapes. Incorporates Logical Letter Coding. Price Range: C

CANON COMMUNICATOR M



Canon U.S.A., Inc.

Forms of Output:

Single strip printer.

Functions:

The typing of messages by use of an alphabetized keyboard.

Number of Keys:

31. A thin keyboard cover is provided for persons with motor impairment (such as an incoordinated hand). The thick keyboard cover accessory is available for those using a headpointer or pencil.

Programming Capabilities:

A maximum of five user-programmable, frequently used words or phrases can be stored in location A, B, C, D, & E. Each of the five storage locations has a 19-character memory capacity. (95 character total)

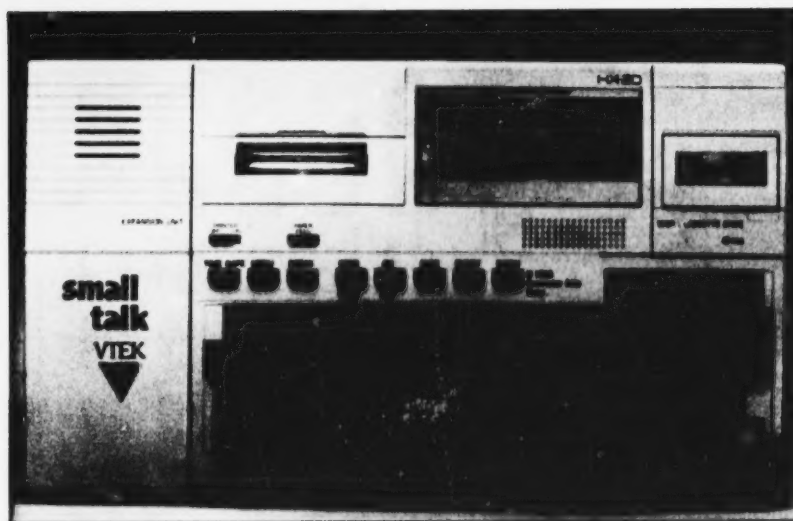
Approx. Weight and Size:

9 oz. 5" X 3" X 1"

Price Range:

A

SMALL TALK



VTEX

Forms of Output:

Synthesized voice, 4-line 20 character/line display screen, and a 24-column printer.

Functions:

Recall of user preprogrammed information. The inputting of messages by use of a typewriter keyboard. Meets the needs of the blind and visually impaired person by allowing the user to hear what is being entered into the computer. Built-in word processing program, Word-Talk, and scientific calculator, Calc-Talk. Can be used to access other computers, printers, and peripherals.

Number of Keys:

Full alphanumeric keyboard plus special operation keys.

Programming Capabilities:

Designed to be completely programmed by the user. 16K RAM memory. Stores 6 full pages of text. Built-in microcassette drive for additional storage.

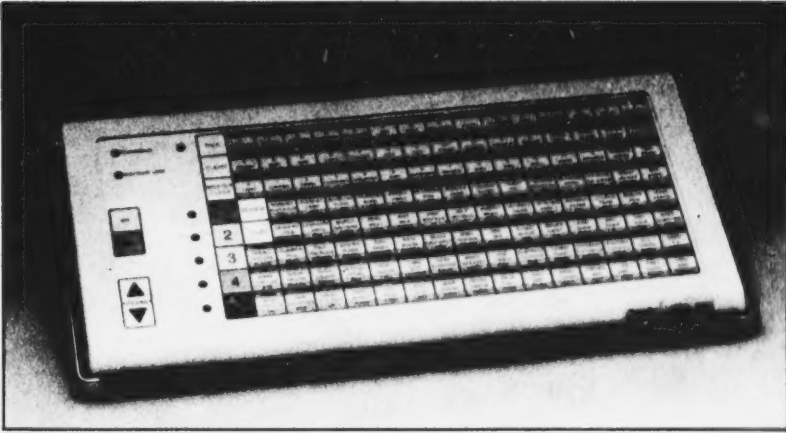
Approx. Weight and Size:

5 lbs. 15" X 8" X 2"

Price Range:

C

VOIS 130



Phonic Ear, Inc.

Forms of Output:

Synthesized voice.

Functions:

Recall of preprogrammed words/phrases. The typing of messages by use of membrane squares. Combining of phonemes to create words.

Number of Squares:

128. Keyguard cover available.

Programming Capabilities:

Contains approximately 500 preprogrammed letters, words, phrases, numbers and phonemes on 4 color-coded levels. The 5th level is designed to be programmed by the user and has 118 programmable locations with a capacity of 3,000 entries.

Approx. Weight and Size:

3 lbs. 17" X 9" X 3"

Price Range:

C

VOIS 135



Phonic Ear, Inc.

Forms of Output:

Synthesized voice.

Functions:

Recall of preprogrammed words/phrases. The typing of messages by use of membrane squares. Combining of phonemes to create words.

Number of Squares:

128. Keyguard cover available.

Programming Capabilities:

Contains 113 preprogrammed words, phonemes and phrases on Level 1. Four levels are designed to be programmed by the user. Each level contains 118 locations. Total capacity of 5000 entries.

Approx. Weight and Size:

3 lbs. 17" X 9" X 3"

Price Range:

C

64

60

VOIS 140



Phonic Ear, Inc.

Forms of Output:

Synthesized voice.

Functions:

Recall of preprogrammed words/phrases. Combining of phonemes to create words.

Number of Squares:

16 arranged in a 4 X 4 matrix.

Programming Capabilities:

Contains approximately 1,000 preprogrammed letters, words, phrases, numbers, and phonemes. User programmable memory in 99 locations with a capacity of 3,000 entries. Recall using three digit encoding.

Approx. Weight and Size:

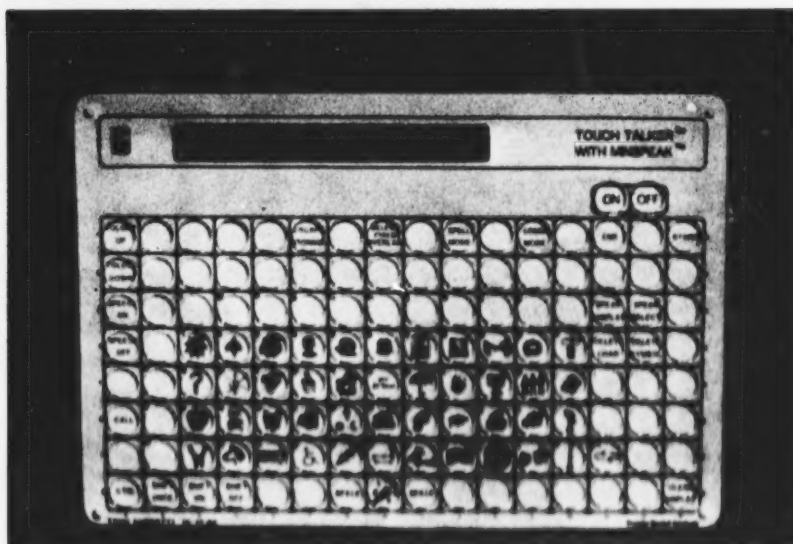
3 lbs. 9" X 8" X 4"

Price Range:

C

65

TOUCH TALKER (Minspeak Version)



Prentke Romich Company

Forms of Output:

Synthesized voice and 2-line 40 character/line display screen.
Optional printer.

Functions:

Recall of preprogrammed words/phrases. The typing of messages by use of membrane squares that consist of letters and numbers, each with a corresponding picture or symbol. Can be used to access Apple computers (Models II+, IIe, IIc) and IBM PC computers.

Number of Squares:

8, 32, or 128 location overlays are possible. Keyguard cover included.

Programming Capabilities:

Designed to be completely programmed by the user. Combining pictures into words and phrases aids in recall.

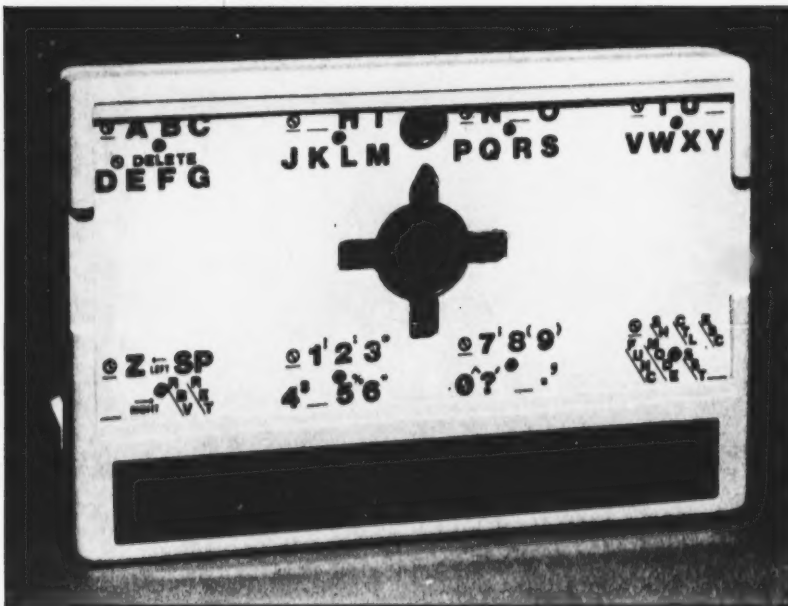
Approx. Weight and Size:

5 lbs. 13" X 9" X 3"

Price Range:

C

EYETYPER, MODEL 200



Sentient Systems Technology, Inc.

Forms of Output:

40-character single line display bar and built-in synthesized voice.

Functions:

Non-contact typing of messages based solely on direct eye-gaze contact on letters and picture overlays. Can be interfaced to a computer, a modem, a printer, and environmental control devices.

Number of Light Sensors:

8 eye-gaze sensor positions.

Programming Capabilities:

A typing program and matching overlay provides access to 49 characters. Blank overlays are included that correspond to any program designed for the user. Capacity for 8 programmable overlays and an abbreviation expansion system make it possible to store and retrieve messages by letter codes.

Approx. Weight and Size:

3 lbs. 8" X 12" X 3"

Price Range:

C

67

SPECIAL FRIEND SPEECH PROSTHESIS



Shea Products, Inc.

Forms of Output:

Synthesized voice and 40-character display screen.

Functions:

Recall of preprogrammed words/phrases. The typing of messages, by use of membrane squares.

Number of Squares:

53. Keyguard cover available.

Programming Capabilities:

There are 9 pages of preprogrammed frequently used phrases and 26 pages that are user programmable containing 676 storage locations with nearly 7000 characters.

Approx. Weight and Size:

6 lbs. 15" X 10" X 3"

Price Range:

C

SPEAK N' SPELL



Texas Instruments

Forms of Output:

Synthesized voice and 8-character display screen.

Functions:

The typing of messages by use of membrane squares.

Number of Squares:

40

Programming Capabilities:

None.

Approx. Weight and Size:

1 lb. 10" X 7" X 2"

Price Range:

A

VOCAID



Texas Instruments

Forms of Output:

Synthesized voice.

Functions:

The recall of preprogrammed letters/words/phrases. The typing of messages by use of membrane squares.

Number of Squares:

36

Programming Capabilities:

Preprogrammed content. There are 4 overlays (or panels), each containing different words/phrases. The Vocaid does not contain any memory for user programming.

Approx. Weight and Size:

3 lbs. 15" X 10" X 2"

Price Range:

A

WORDS+ PORTABLE VOICE II (Keyboard Version)



Words+, Inc.

Forms of Output:

Synthesized voice, 4-line 20 character/line display screen, and a column printer.

Functions:

Recall of user preprogrammed words and phrases. The inputting of data using a typewriter keyboard. A calculator mode is also included.

Number of keys:

Standard typewriter keyboard plus special operation keys.

Programming Capabilities:

Designed to be completely programmed by the user. Large capacity memory. Acceleration methods include Abbreviation Expansion, Stored Sentences, Instant Speech, and Stored Speech.

Approx. Weight and Size:

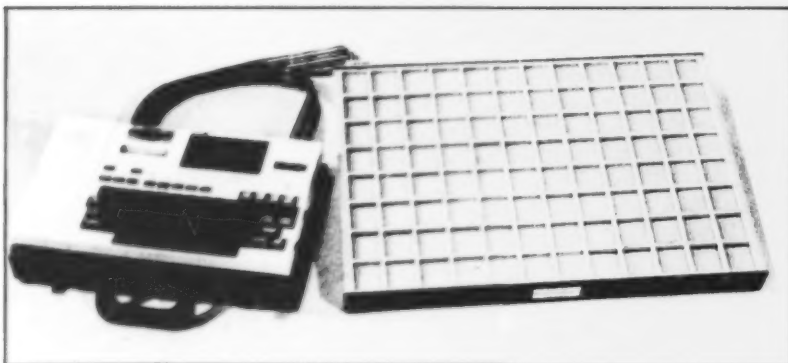
10 lbs. 5" X 12" X 9"

Price Range:

C

The following devices incorporate the features of the Words+ Portable Voice II but was designed to meet the needs of individuals without standard keyboard skills.

WORDS+ PORTABLE VOICE II (Expanded Keyboard Version)



Words+, Inc.

The Expanded Keyboard Version consists of the Words+ Portable Voice II and an external switch panel which acts as an expanded keyboard to the computer. The switches can range in number from 1 to over 100 and in size from 1" X 1" to as large as practical. The faces of the individual switches can be Blissymbols, Rebus symbols, alphabet, numbers, pictures, etc. Words+, Inc. custom makes expanded keyboards to the number and size of keys desired. (The expanded keyboard shown above contains 96 keys 2" X 2".) The spoken or printed output is totally programmable by the user. The unit can be programmed to produce multiple levels of output for each switch. Forms of outputs: synthesized voice, 4-line 20 character/line display screen and a column printer. Price Range: C

WORDS+ PORTABLE VOICE II (Morse Code Version)

The Morse Code Version is capable of all the functions of the Keyboard Version and can be operated with as little as a single switch (or with two switches) using Morse Code.

LIGHTWRITER*



Zygo Industries, Inc.

Forms of Output:

Two, 20-character display screens (one on each side of the device) and a 24-column printer. Synthesized voice is optional.

Functions:

Recall of preprogrammed words/phrases. The typing of messages by use of a typewriter keyboard.

Number of Keys:

Full size standard typewriter keyboard. Keyguard cover available.

Programming Capabilities:

Preprogrammed content-20 common phrases and 6 most often used words. User programmable (10 keys)-9 keys accept up to 50 characters each and 1 key accepts up to 395 characters for note-taking, etc.

Approx. Weight and Size:

5 lbs. 13" X 4" X 12"

*LIGHTWRITER is a trademark
of Toby Churchill Ltd

Price Range:

C

69

73

NOTEBOOK



Zygo Industries, Inc.

Forms of Output:

8-line 40 character/line display screen.

Functions:

Recall of user preprogrammed information. The typing of messages by use of a typewriter keyboard. Contains a word processor with single finger access. The notebook can be used in conjunction with printers, floppy disk drives, data recorders, and modems.

Number of Keys:

Standard typewriter keyboard plus 10 function keys. Keyguard cover available.

Programming Capabilities:

Designed to be completely programmed by the user. 16K RAM memory (standard). Additional 16K RAM (optional).

Weight and Size:

4 lbs. 12" X 8" X 2"

Price Range:

B

DEVICES USING SCANNING FOR INPUT

Scanning: A selection made where the user chooses a desired item from a visual display (in auditory scanning the user can hear the items) of letters, numbers, symbols, words, phrases or pictures, etc., and activates the device at the appropriate moment in time when the desired item is reached. Devices can be activated by as simple a motion as an eye-blink, or by more gross motions such as head or leg movements, etc., using various types of switches: single or multiple, brow-wrinkle, pneumatic 'puff-sip', infrared, electromyographic, joystick, etc.

Sequential Scanning:

Words, letters, etc., are scanned one at a time in a linear manner until the desired item is reached.

Row-Column Scanning:

All of the items on the scan display are offered to the user, a row at a time, until the desired row is reached. Then each item in the row is scanned until the desired item is selected.

Directed Scanning:

The direction of the scan can be controlled by the user. (Horizontally, vertically or diagonally)

Scanning enables persons with only a single, consistent, voluntary physical action (like some persons with ALS), or those who may have pointing skills but are unable to expend the energy necessary to effectively use direct selection (like persons with some types of cerebral palsy), to operate a computer.

Some types of scanning, such as row-column, require very good tracking and visual skills and the user must not be susceptible to uncontrolled reflex actions caused by flashing lights or time demands. For example, persons with athetoid cerebral palsy may not be able to respond to the time demands required in scanning.

Scanning Devices

Omni II Communication System

Dial Scan

Versascan

Special Friend Scanning Speech Prothesis

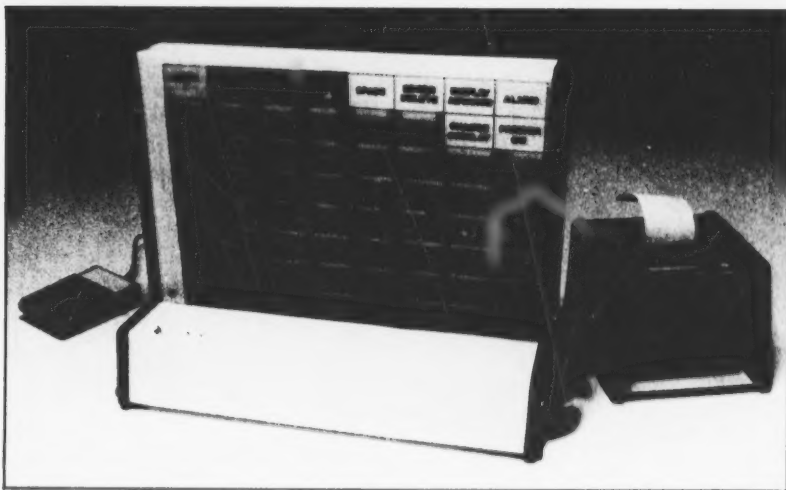
ScanWRITER

Zygo Model 16C

Zygo Model 100

These devices are described on the following pages. Contact the company for more complete information.

OMNI PHASE II COMMUNICATION SYSTEM



Communication Research Corp.

Forms of Output:

A dual sided illuminated display board and a dual sided LCD display on the reader/printer, plus hard copy line printout. Optional voice synthesizer.

Functions:

Visual or print communication is attained by advancing a light to the desired letter, word or picture. Preprinted, interchangeable overlays are available and also grid indicators for user design. Omni can be used to access computers that accept standard terminals and the IBM Selectric Typewriter.

Number of squares:

8 to 64. The squares (frames) are adjustable for display of enlarged pictures, symbols or words.

Scan type:

Direct selection; sequential, row-column, or row-light scanning.

Programming Capabilities:

16K of programmable memory.

Approx. Weight and Size:

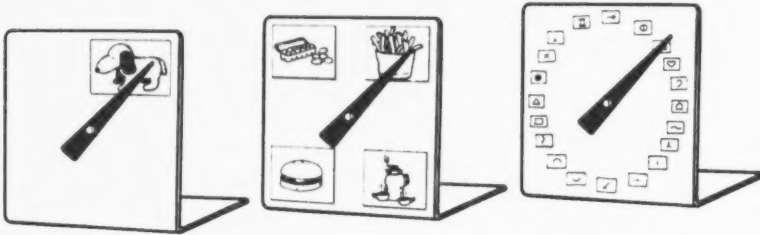
9 lbs. 14" X 11" X 2"

Price Range:

C

??

DIAL SCAN



Don Johnson Developmental Equipment

Forms of Output:

A bi-directional scanning dial designates the desired word/phrase/picture from an overlay designed by the user.

Functions:

Visual communication by advancing the dial to a desired message.

Number of squares:

Up to 32 items.

Scan type:

Sequential bi-directional.

Programming Capabilities:

None.

Approx. Weight and Size:

2 lbs. 12" X 12" X 6"

Price Range:

A

VERSASCAN



Prentke Romich Company

Forms of Output:

An illuminated light designates the desired word / phrase / picture on an overlay designed by the user.

Functions:

Visual communication by advancing a light to a desired message.

Number of Lights:

2 to 16

Scan Type:

Sequential, rotary.

Programming Capabilities:

None.

Approx. Weight and Size:

4 lbs. 12" X 11" X 3"

Price Range:

B

70

SPECIAL FRIEND SCANNING SPEECH PROSTHESIS



Shea Products, Inc.

Forms of Output:

Synthesized voice and a scrolling 40-character display screen.

Functions:

Recall of preprogrammed words/phrases and the entering of messages by use of scanning.

Number of Squares:

53

Scan Type:

Row-column or multi-position switching scan. Can also be programmed by direct input via light-pen.

Programming Capabilities:

9 pages of preprogrammed frequently used phrases and 26 pages that are user programmable containing 676 storage locations with nearly 7000 characters.

Approx. Weight and Size:

8 lbs. 15" X 10" X 4"

Price Range:

C

80

scanWRITER



Zygo Industries, Inc.

Forms of Output:

20-character display screen and column printer.

Functions:

Recall of user preprogrammed words/phrases and the entering of messages by use of scanning. Calculator. Can also be used to access the more popular brands of computers and speech synthesizers.

Number of Squares:

64

Scan Type:

Row-column or directed.

Programming Capabilities:

User programmable memory 800-character/40 locations for quick recall and 4000 character/156 locations.

Approx. Weight and Size:

4 lbs. (plus battery) 10" X 10" X 5"

Price Range

D

77

82

ZYGO MODEL 16C



Zygo Industries, Inc.

Forms of Output:

An illuminated light designates the selected word/phrase/message on a variety of overlays.

Functions:

Visual communication by advancing a light to a desired message.

Number of Squares:

2 to 16 light message display areas.

Scan Type:

Sequential and row-column.

Programming Capabilities:

None.

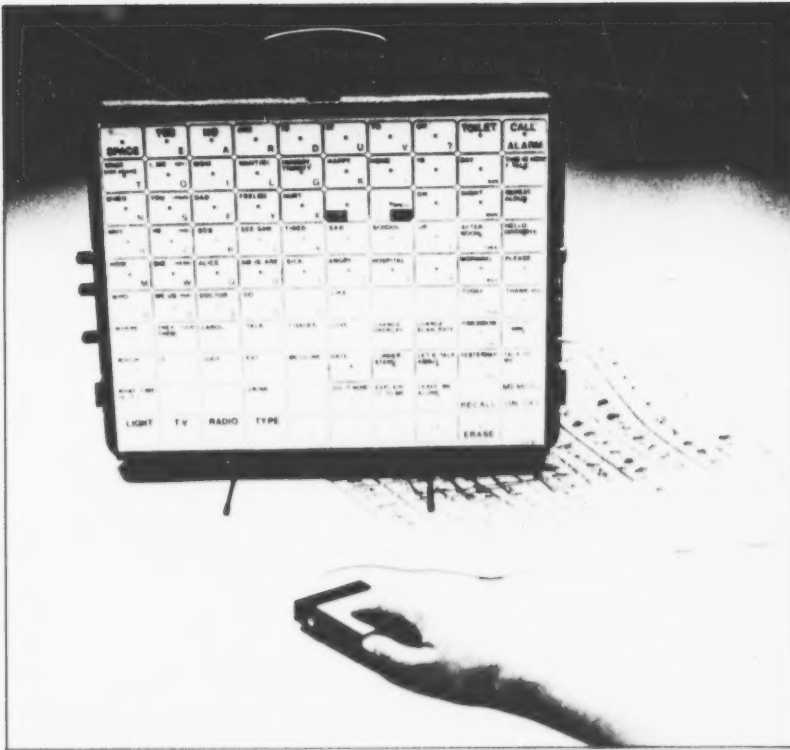
Approx. Weight and Size:

14 lbs. 19" X 15" X 4"

Price Range:

A

ZYGO MODEL 100



Zygo Industries, Inc.

Forms of Output:

An illuminated light designates the selected word/phrase/message on a variety of overlays.

Functions:

Visual communication by advancing a light to a desired message.

Number of Squares:

100 light message display areas.

Scan Type:

Row-Column or directed.

Programming Capabilities:

User programmable 16-message area, "short term" memory.

Approx. Weight and Size:

14 lbs. 19" X 15" X 4"

Price Range: B

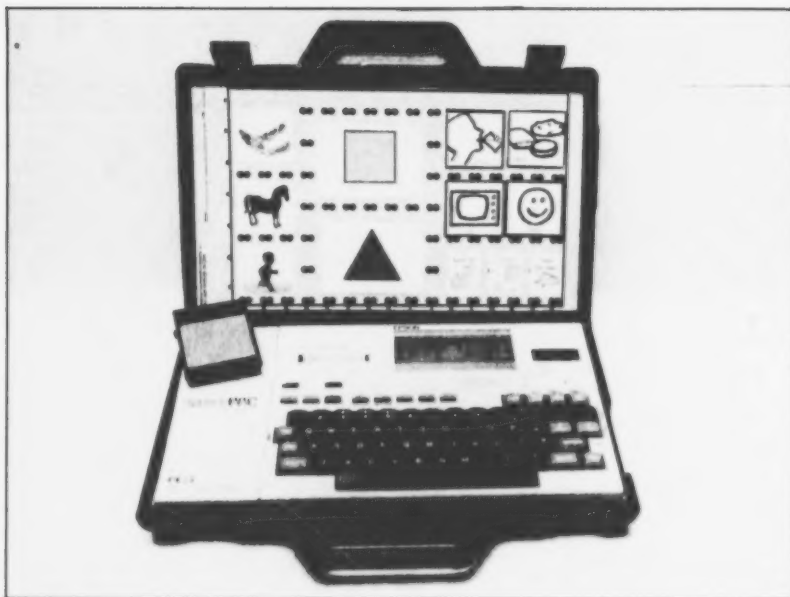
DEVICES CAPABLE OF USING EITHER DIRECT SELECTION OR SCANNING

The communication devices listed in this category can be used with either the direct selection or scanning input method. Where a device is to be used by several persons, such as in a school or rehabilitation setting, it may be desirable to select one that features both types of input methods.

ACS SpeechPac/ScanPac
Vois 150
Light Talker (Minspeak Version)
Words+ Equalizer II

These devices are described on the following pages. Contact the company for more complete information.

ACS SPEECHPAC/SCANPAC



Adaptive Communication System, Inc.

Forms of Output:

Synthesized voice. 4-line 20 character/line display screen and a column printer.

Functions:

Recall of user preprogrammed words/phrases. The entering of messages by use of a typewriter keyboard or by various types of gross motor control switches and joysticks. May be used to access an Apple IIe computer.

Selection Technique:

Direct selection with a standard typewriter keyboard plus special operation keys. Row-column or directed scan. Scanning rate can be controlled by the user. Morse Code.

Programming Capabilities:

Designed to be completely programmed by the user with 15 different levels available to store different programs. Additional programs can be stored on microcassette tapes. Incorporates Logical Letter Coding to represent sentences, phrases or words.

Approx. Weight and Size:

5 lbs. 9" X 15" X 2"

81

Price Range:

85⁰⁰ C

VOIS 150



Phonic Ear, Inc.

Forms of Output:

Synthesized voice.

Functions:

Recall of preprogrammed words phrases and the entering of messages by use of keyboard or scanning. Combining of phonemes to create words.

Number of Squares:

16

Selection Technique:

Direct selection. Row-column or directed scan using a joystick.

Programming Capabilities:

Contains approximately 1,000 preprogrammed letters, words, phrases, numbers and phonemes. User-programmable memory in 99 locations with a capacity of 3,000 entries. Recall using 3-digit encoding. A special tone system permits operation by individuals who are blind or visually impaired.

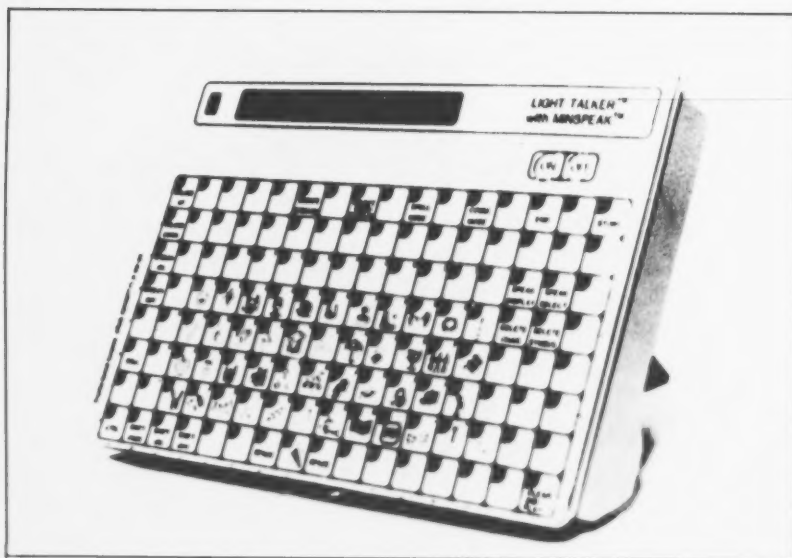
Approx. Weight and Size:

4 lbs. 17" X 9" X 3"

Price Range:

C

LIGHT TALKER (Minspeak Version)



Prentke Romich Company

Forms of Output:

Synthesized voice and 2-line 40 character/line display screen.
Optional printer.

Functions:

Recall of user preprogrammed words/phrases. The input of messages using a light sensor to activate the keyboard, that consists of letters and numbers, each with a corresponding picture or symbol. Can be used to access Apple computers (Models II+, IIe, IIc) and IBM PC computers.

Selection Technique:

Designed for persons without touch capabilities. Direct selection through an optical headpointer. 8, 32, or 128 location overlays are possible. Row-column or directed scanning. Morse Code.

Programming Capabilities:

Designed to be completely programmed by the user. Combining pictures into words and phrases aids in recall.

Approx. Weight and Size:

5 lbs. 13" X 9" X 3"

Price Range:

C

WORDS+ EQUALIZER II



Words+ Inc.

The Equalizer is a "menu-driven" system. The user selects items from "menus" or lists that appear on the screen. It provides speech output, writing (full word processing), drawing, music, games, and a calculator, all with just a single switch input device, such as a Words+ Infrared Switch. It is portable and is based on either the Datavue 25 or the GridCase laptop computer. Each of these computers is a battery-powered MS-DOS ("IBM-compatible") system with a large visual display. Words+ put the computer together with a battery-powered voice synthesizer and a battery-powered printer, and Words+ Equalizer software. It also incorporates "Instant Speech" and "Word Prediction". The Equalizer is an advanced, integrated portable system with growth capability. Price Range: D

DEVICES FOR BLIND AND VISUALLY IMPAIRED PERSONS

Communication aids for this segment of the communication disabled population are available in three kinds of output: tactile (braille), synthesized speech, and large print for those with partial sight.

Viewscan Text System

VersaBraille II

Optacon

Cranmer-Perkins Brailier

These devices are described on the following pages. Contact the company for more information.

VIEWSCAN* TEXT SYSTEM



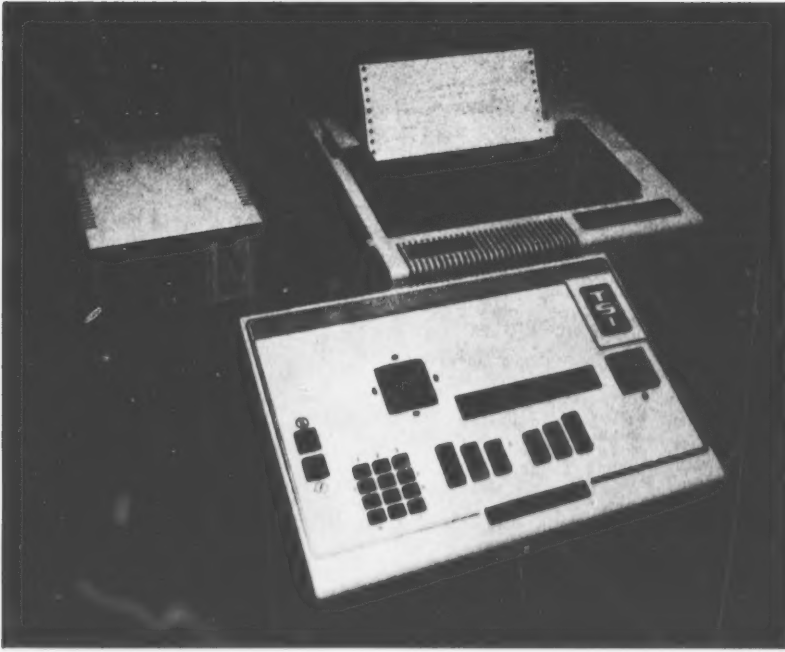
Sensory Aids, Inc. (Midwestern states)

Telesensory Systems, Inc. (All other states)

The Viewscan Text System utilizes the Epson HX-20 micro-computer and was designed for the individual with partial vision. When messages are entered into the computer, they are held in memory and can be read through scrolling across the screen. The size of the print, as well as the speed, may be altered to suit the individual. A small hand-held scanner reads text and magnifies the image up to three inches high in orange and black on the screen. A standard typewriter keyboard allows the user to access the personal computer. A built-in microcassette increases data storage by 100K of memory with every cassette tape inserted. A disk drive is also available as an alternative to the tape drive, allowing faster storage operation. Features include: column-printer, battery-portability, and the interface capacity to connect with printers, external computers, and other communication systems. Price Range: D

*VIEWSCAN is a registered trademark of Wormald International Sensory Aids.

VERSABRAILLE II



Telesensory Systems, Inc.

The VersaBraille II system consists of a portable battery-operated computer unit equipped with a rubberbrane keyboard that allows almost silent brailleing, TSI's braille display and a disk memory unit that contains two standard 3 1/2" microdisk drives. With this system a blind person can work in the braille media, but receive and transmit information in print. This two-way translating of documents between braille and printed information allows blind and sighted persons to work together. It is fully programmable with 112K bytes of memory. Each disk drive expands the storage capacity to 640,000 characters per disk. Three I/O ports are available to communicate with printers, other computers, terminals and modems. The unit is approximately 15" X 10" X 3" and weighs 10 lbs. Price Range: D

The printer shown in the picture above is optional.

OPTACON



Telesensory Systems Inc.

The Optacon Model RID, Print Reading System, is a device that uses a miniature camera which the user tracks across a printed page. It translates optical images from the camera into tactile vibrations. The user then reads these vibrations by placing his fingers into a special pocket, thereby feeling the shape of the letter or numeral being photographed. Knowledge of shapes of numbers and letters is required on the part of the user as well as good hand sensitivity and coordination. Price Range: D

CRANMER-MODIFIED PERKINS BRAILLER



Maryland Computer Services, Inc.

The Cranmer Modified Perkins Braille is a portable, computerized version of the popular Perkins Braille. The unit enables the user to interact with Apple computers and produce hard copy braille documents, graphs and maps. It can also be used to produce grade II braille. The Cranmer Braille works very well with Bex software and the Cranmer Braille, a typist without any knowledge of braille can produce a well-formatted braille document. Individual sheets of paper must be used with this printer. It weighs 27 lbs. and is approximately 16" X 11" X 10" in size. Price Range: C

DEVICE FOR DEAF-BLIND PERSONS

A deaf-blind person's disabilities are very different from those of either a deaf person or a blind person. A blind person can rely on sound to converse, use the telephone, and listen to the radio. A deaf person can rely on vision to use telecommunication devices, to read and they have the advantage of vision in mobility. The deaf-blind must rely solely on touch.

Telebraille

TELEBRAILLE COMMUNICATION SYSTEM



Telesensory Systems, Inc.

Telebraille is a two unit system designed both for face-to-face and telephone communication between two deaf-blind persons or a deaf-blind and a sighted person who does not know braille. The deaf-blind person communicates by using the braille display. The sighted person communicates by using the typewriter keyboard on the Superphone, which is connected to the braille unit, and receives messages on its 32-character display. Information from either keyboard appears simultaneously on both display units. The Telebraille system can be used to communicate over the telephone with any TDD or computer terminal with an ASCII or Baudot modem. Correspondingly, messages sent over the telephone line to the Telebraille system from TDDs or a computer will be displayed in braille. The system is battery operated and portable. Price Range: D

DEVICES FOR DEAF AND HEARING IMPAIRED PERSONS

Telecommunication devices for the deaf (TDDs) enable persons who are deaf to communicate over the telephone directly with another person who has a compatible device. A person types a message on the TDD keyboard and it is transmitted by code via telephone lines to another device, where the message is either visually displayed on a screen or printed out on paper, eliminating the need for an interpreter.

TDDs can be stationary devices or portable, battery-operated devices. An acoustic coupler allows the TDD to send and receive typed messages through a standard telephone handset, making it possible to use the device from any location where there is a telephone.

The advent of microcomputer technology has now made it possible for deaf and hearing impaired persons to reach out to others with computers and computer-like devices. However, computers use the ASCII communication code rather than the Baudot code that is often used with TDDs. There are some devices currently available that give the user both the ASCII and the Baudot codes. These dual systems provide the user with the best of both worlds.

Devices for the Deaf

Porta Printer Plus

PortaView, Jr.

Handsets for Hearing Amplification

Minicom II

Superphone B/X

Superprint

Intele-Type

Video Voice Speech Training System

PORTA PRINTER PLUS*



AT&T National Special Needs Center

The Porta Printer Plus is a portable, battery operated telecommunication device for the deaf, a TDD that enables them to communicate to any location where there is a compatible unit and telephone. The telephone handset is placed in the receptacles (acoustic coupler) on the device. Messages are displayed on a one-line display screen and a built-in printer provides a record of the conversation. The unit operates on standard household electrical current or its own rechargeable battery pack. Printer uses commercially available standard paper rolls. The unit weighs approximately 5 lbs. Price Range: A

*PORTA PRINTER PLUS is a trademark of Krown Research, Inc.

PORTAVIEW, JR.*



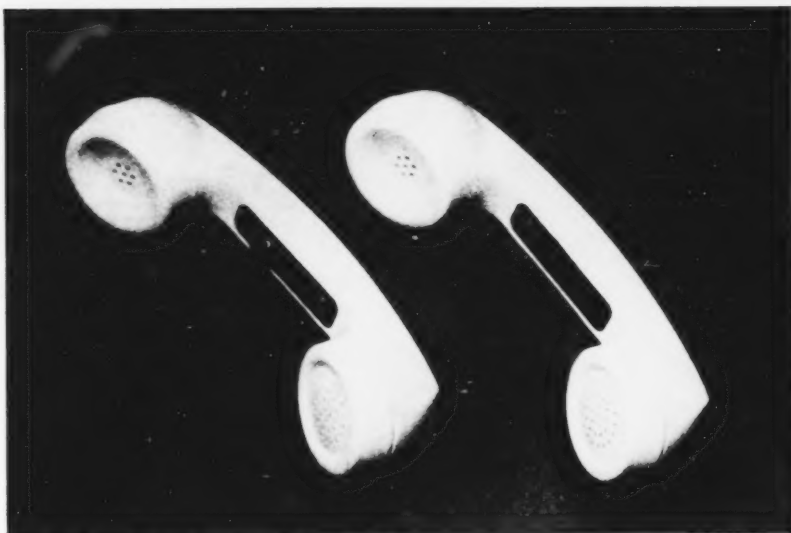
AT&T National Special Needs Center

This is a portable, 3.5 pound teletypewriter for the deaf, that provides a quick and easy communications link to home, office or any location where there is a compatible unit. Conversation appears on an easy-to-read electronic display panel.

Its rechargeable battery pack lets the PORTAVIEW, Jr. be used remotely for up to four hours. It also uses household current. The receptacles (acoustic coupler) in the unit will accommodate most standard telephone handsets. Comes with shoulder strap for easy carrying. Price Range: A

*PortaView, Jr. is a trademark of Krown Research, Inc.

HANDSETS FOR HEARING AMPLIFICATION



AT&T National Special Needs Center

The volume of the voice being heard over the telephone can be increased by as much as 30 percent with the Volume Control handset. Incoming sound can be adjusted by a small dial in the center of the handset. The handset plugs into any modular telephone (Model G-6).

The handset is also available in a high gain model which boosts incoming volume an additional 15 percent at the push of a button (Model G-66). Price Range: A

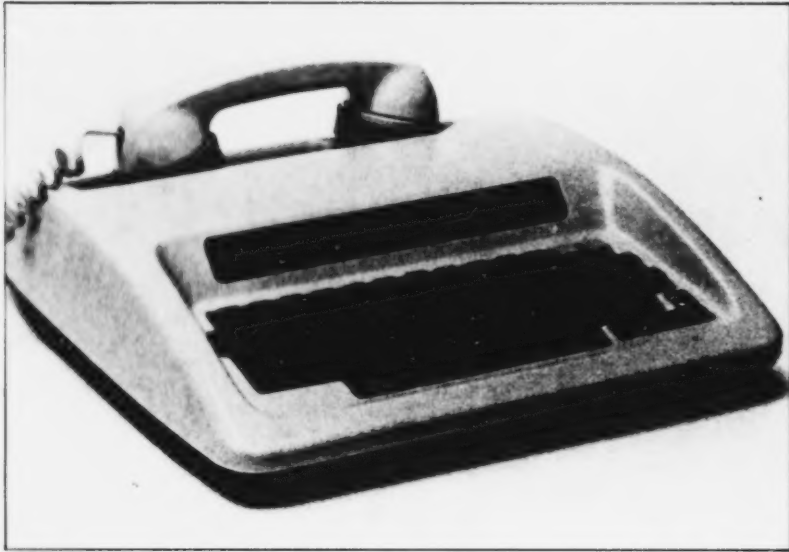
MINICOM II



Ultratec, Incorporated

The Minicom II is a portable, battery-operated telecommunication device for the deaf, a TDD with all the features needed to make and receive telephone calls to other compatible devices at home, school, or the office, even from a phone booth. It features a 31-key, 3-row Baudot style keyboard for sending messages, and a 20-character display for receiving incoming messages. It comes with an AC charger/adaptor and built-in rechargeable batteries. A vinyl carrying case is optional. The unit weighs less than 2 pounds. Price Range: A

SUPERPHONE B/X

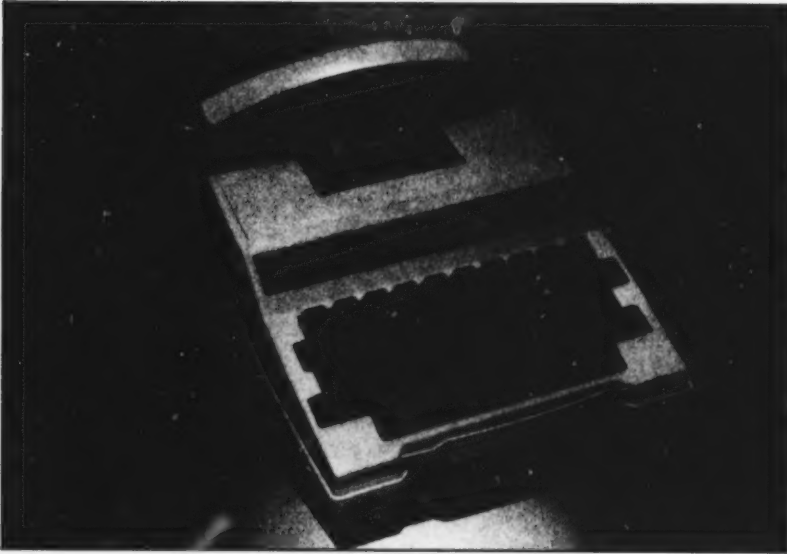


Ultratec, Incorporated

The Superphone B/X comes equipped with both Baudot and ASCII codes, so it can be used as a TDD or as a computer terminal. It has a 54-key typewriter keyboard, a 32-character message display and a 2048-character memory that automatically saves or sends messages that enables the user to review conversations or even type them before dialing. It features a printer port, built-in rechargeable batteries, sensitivity control that corrects weak telephone connections and telephone ring signaler. An Electronic Voice is optional that can be used to call any hearing person without that person needing a TDD on the receiving end. When words are typed by the deaf person on the Superphone, the words are spoken into the telephone by the electronic voice. With the optional Touch-Tone (R) Receiver, hearing persons can even respond by typing messages on the keypad of a Touch-Tone (R) phone. Other options include braille output, an 80-column printer, and a carrying case.

Persons interested in this device should call Ultratec and inquire about the availability and price.

SUPERPRINT



Ultratec, Incorporated

The Superprint Series (100, 200, or 400) are portable, printing telecommunication devices for the deaf (TDDs) that enable them to "talk" with other TDDs, to computers, and ASCII TDDs by adding an optional Computer (ASCII) Code Module. Every Superprint in the series comes with a 43-key, 4-row keyboard, a 2048-character memory to save and send messages, a 20-character display, rechargeable batteries, an AC charger/adaptor, and a built-in carrying case. The Superprint 100 comes with a printer port for hook-up to an external printer. The Superprint 200 comes with a built-in 24-character printer. The Superprint 400 comes with an Auto-Answer Module that answers the phone and takes messages. It also connects directly to the phone line, has keyboard dialing, and a built-in printer. The unit weighs approximately 5 pounds. Price Range: A

INTELE-TYPE



Ultratec, Incorporated

The Intel-Type is a portable computer terminal, typewriter, telephone, and telecommunication device for the deaf (TDD). It comes equipped with both Baudot and ASCII codes and can be connected directly to a phone line or used with an acoustic coupler. It features an 80-column letter-quality printer, a 73-key keyboard with 22 special keys, a 16-character display, a memory of 3726 characters (an additional 4K is available as an option), Auto-Answer, keyboard dialing, and a built-in calculator. It can be used with an AC adapter or optional rechargeable batteries. Other options include extra 4K memory, a carrying case, and an acoustic coupler. The unit weighs approximately 6 pounds. Price Range: A

VIDEO VOICE SPEECH TRAINING SYSTEM



Micro Video

Video Voice is a computer aided speech training system that makes it possible for hearing impaired individuals to "see what they say" and learn to speak more clearly. A color video screen provides a visual representation of their speech. Correct pronunciations of words and phrases are entered into the system, then the hearing impaired person tries to produce the same wave patterns to match the model on the screen. This enables the users to see which sounds they still need to improve. It also makes it possible for individuals to use their voices to move a cursor around the screen. If the correct sounds are made, the cursor erases the pre-designed word pattern. This visual reinforcement gives the user a method to measure progress.

The Video Voice System is available for school and clinical use. Standard systems include: various voice patterns that can be stored, scoring rewards for excellent performance, and reporting and analysis capabilities. Price Range: C

DEVICE FOR SPEECH AND HEARING IMPAIRED PERSONS

LIFESTYLE PERSONAL COMMUNICATOR



Garid, Inc.

The Lifestyle Personal Communicator is a portable, AC/battery-operated communication device that enables speech and hearing impaired persons to use any telephone to call hearing persons, computers, and other telecommunication devices (TDDs, TTYs). It incorporates both the Baudot and ASCII codes and connects to any telephone with the acoustic coupler or directly to phone lines. Some of its features and capabilities are:

- A voice synthesizer to speak to hearing persons over the phone or in person with pre-recorded messages or as typed.

- A 40-character visual display.

- 59 keys in standard typewriter layout, plus computer function keys.

- Holds up to 253 messages in memory, up to 177 phone numbers, and can store conversations with computers and TDDs.

- Automatic dialing and call progress monitoring.

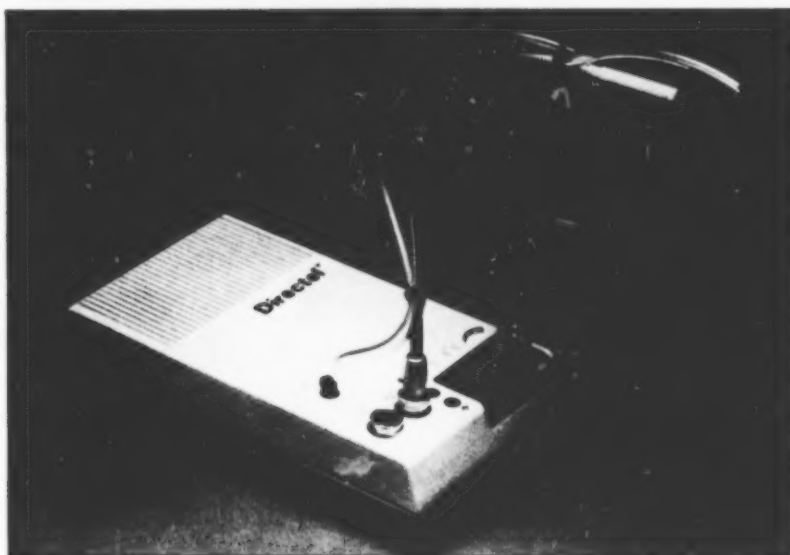
- Word processing and calculator functions.

- Built-in rechargeable batteries.

It weighs 18 ounces and is approximately 4" X 9" X 1" in size. Price Range: B

TELEPHONE DEVICE FOR MOTOR IMPAIRED PERSONS

DIRECTEL*



AT&T National Special Needs Center

This special telephone is designed for persons with motion impairments. To place, receive and disconnect calls, the user simply blows into the Directel's plastic tube. Directel connects the user to a telephone operator who will dial the call. The unit comes with an adjustable microphone and built-in speaker. It uses standard household current and plugs into a modular telephone outlet. It comes with a built-in rechargeable battery for use during power outages.

Directel can be fitted with a variety of special switches, microphones and headsets. Price Range: A

*Directel is a trademark of Bell Canada.

TELEPHONE DEVICE FOR SPEECH AMPLIFICATION
HANDSET FOR SPEECH AMPLIFICATION



AT&T National Special Needs Center

This volume control handset is used by persons with weak speech, or by friends and relatives of hearing-impaired persons. It allows them to be heard without raising their voices.

This handset increases the volume of a speaker's voice by as much as 30 percent by merely adjusting the volume with a small dial in the handset. It is designed to plug into any modular telephone. Price Range: A

SPEECH SYNTHESIZERS USED WITH STATIONARY AND PORTABLE COMPUTERS

Speech synthesizers are used by speech impaired and hearing impaired persons to communicate orally with others and by the visually impaired to hear the data being inputted into a computer.

In selecting a voice synthesizer it is crucial that the synthesizer, hardware, and software are compatible with each other. Voice selection is a personal decision as the quality of voice output available ranges from excellent to robotic.

Since prices may vary by time and area and with accessories and adaptations, the following range codes may be helpful.

PRICE RANGE	CODE
Under \$200	A
\$200-\$500	B
\$500-\$1000	C
\$1000-\$2000	D
Over \$2000	E

The following is a list of some of the speech synthesizers on the market today.

CRICKET: (Street Electronics Corporation) A synthesizer that brings the features of the Echo+ to the Apple IIc. It offers two separate voice modes, a vocabulary of over 700 commonly used words in a female voice as well as a large vocabulary in a synthesized voice. Converts ASCII text into speech. Price Range: A

ECHO PC2 : (Street Electronics Corporation) A synthesizer that is designed for use with IBM PC computers. Converts ASCII text into speech. Includes 3 separate voice capabilities: the two voice modes on the Echo+, Echo GP, and Cricket, plus a phoneme mode for encoding words and phrases using phonemes. Price Range: A

ECHO+: (Street Electronics Corporation) It is the enhanced version of the Echo II synthesizer and is designed for use with an Apple IIe, or II+ computer. Converts ASCII text into speech. Includes the same two voice modes as the Cricket and Echo GP. Many educational programs have been written to be used with this synthesizer. Price Range: A

ECHO GP: (Street Electronics Corporation) is a general purpose synthesizer featuring a built-in microprocessor that can be used with any computer system using the standard RS232 C serial interface. Converts ASCII text into voice. Includes the same two voice modes as the Cricket and Echo+. Many visually impaired users take advantage of this synthesizer to "hear" what they are typing. Price Range: A B

TYPE-'N'-TALK PERSONAL SPEECH SYSTEM: (Votrax, Inc.) A general purpose synthesizer with built-in microprocessor which is compatible with various brands of computers. The system stores basic speech sounds and rules for combining them into words. Type-'N'-Talk can produce an almost unlimited number of sound combinations and requires only a little of the computer's memory. Price Range: B

Other speech synthesizers from Votrax, Inc., include:

Votalker AP for Apple II, IIe, II+ computers.

Votalker C-64 for the Commodore 64 personal computer.

Votalker IB for the IBM PC, IBM-XT computers.

INTEX TALKER: (Intex Micro Systems Corporation) A general purpose synthesizer with a built-in microprocessor which may be interfaced to any computer, modem, or other output devices. The vocabulary spoken consists of the 64 phonemes. It converts the ASCII text to the proper phoneme strings to create speech. Price Range: B

PC-MATE SPEECH MASTER: (Tecmar, Inc.) The Speech Master provides voice capability for the IBM PC. It allows for two methods of speech production: a pre-stored limited vocabulary speech output and a phoneme synthesizer to create speech. Price Range: B

UFONIC VOICE: (Jostens Learning Systems)

The Ufonic Voice System operates in conjunction with the Apple II+ and Apple IIe microcomputers. The system has its own self contained memory allowing it to generate speech, without robbing the computer's memory needed to run complex programs. It allows the user or teacher to include speech in self-written programs, add speech to programs already designed, and provides courseware programs written for the classroom. Price Range: B

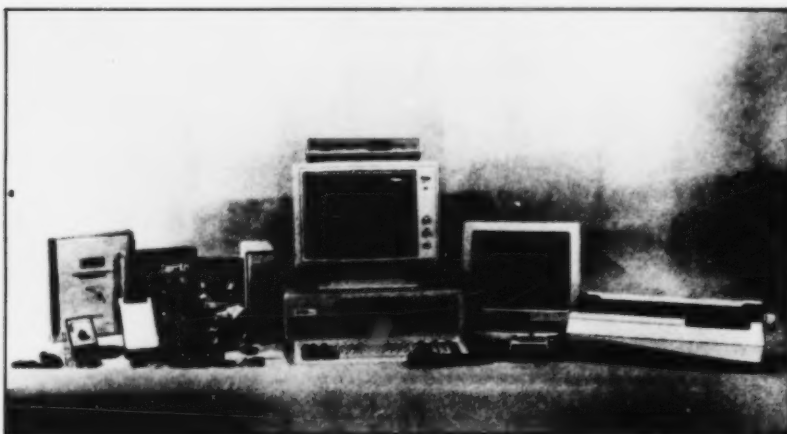
DECTALK: (Digital Equipment Corporation) Dectalk is a very sophisticated synthesizer and will interconnect to most computers. It converts ASCII text into relatively natural speech. It offers a male, a female, and a child's voice. Dectalk has an extensive vocabulary and pronounces words with relative accuracy. Price Range: E

EVALUATION AND ASSESSMENT SYSTEMS FOR PROFESSIONALS

The field of augmentative communication has expanded rapidly and communication is now possible by persons with almost any combination of physical, cognitive, and language disabilities. While this is wonderful from the communication disabled individual's standpoint, it makes the task of selecting and recommending appropriate electronic aids more complex for rehabilitation professionals. The cost of these sophisticated aids prohibits rehabilitation centers from purchasing one of each to use in client evaluation and assessment. However, to solve this dilemma, there are a few systems currently available that were designed to simulate a wide variety of communication aids, using various input techniques, to assist professionals to make the most appropriate recommendation.

ACES (Augmentative Communication Evaluation System)
ACS EVALPAC
TRAINING AID 2

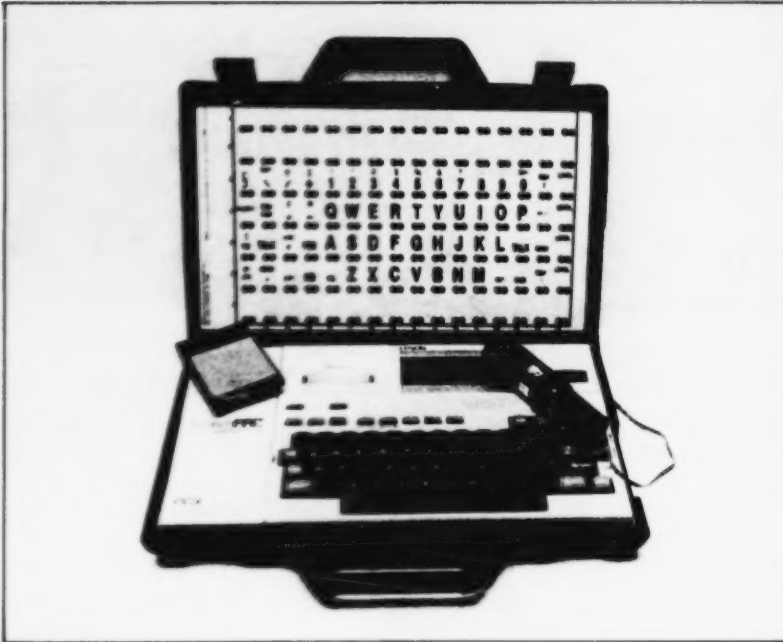
ACES (The Augmentative Communication Evaluation System)



Words+, Inc.

ACES is a system designed to provide therapists and others with an evaluation tool that simulates a wide variety of commercially available communication devices. It contains all the hardware, software, and procedures necessary for an evaluation and assessment to determine an appropriate recommendation for persons with almost any combination of physical, cognitive, and language skills without having all the actual devices available for the client to try. The ACES available software includes: Evaluation Planner, Client Database, Evaluation Test Programs, Evaluation Report Generator, Device Simulation Programs, and several utility programs.

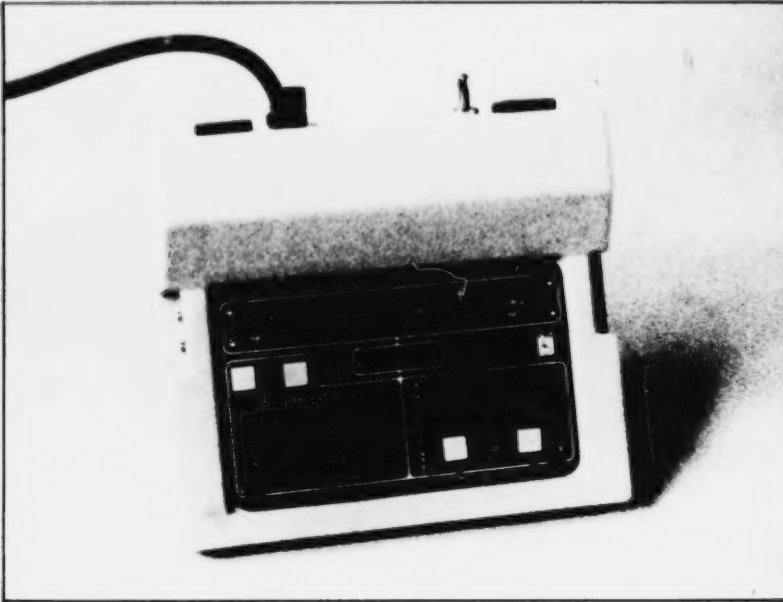
ACS EVALPAC



Adaptive Communication System, Inc.

EvalPAC is a communication, training, and evaluation system which can be adapted to assess the physical and cognitive abilities of an individual to operate an augmentative device. It allows the therapist or others to determine the most effective method of operation for a particular individual; such as standard keyboard, expanded keyboard, switch(s), joystick, lightpointer, and Morse Code. The EvalPAC comes with a packet of overlays consisting of the alphabet and blanks which can be used to create custom designed picture/symbol overlays. The computer's memory holds up to fifteen different programs for the evaluator's custom programs. May be used to access Apple II+, IIe and IBM PC computers.

TRAINING AID 2



Prentke Romich Company

This unit was specifically designed to assist the therapist and others in evaluating the abilities of the low-functioning individual and assist with switch training. It evaluates the person's basic understanding of cause and effect, awareness, control switch operation and proper or requested physical movements. The Training Aid 2 is operated using one or two control switches. Two channels have both AC and battery power output and switch inputs for controlling on/off devices, such as radio, TV, appliances or toys. Internal counters record activations of each control switch and the number of times each reinforcement device (such as TV) is turned on. The unit allows the user to work independently with minimal assistance from the therapist. The Training Aid 2 may also be used as a single environmental control, in which the user controls the on/off, such as a lamp or television.

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PART V

FUNDING FOR AUGMENTATIVE COMMUNICATION AIDS

"It is far more expensive to continue handicapping America than it would be to begin rehabilitating America. Keeping disabled people in dependency is costing us many times more than would helping them to independence."

(Frank Bowe, Office of Technology Assessment, 1982).

INTRODUCTION

A survey taken by The Foundation for Better Hearing and Speech in cooperation with United Cerebral Palsy of Minnesota, found that 64 percent of the providers of services to the disabled who responded, reported that, "One of the major problems in the use of augmentative communication devices was the lack of funding for the purchase or rental." The use of these devices by these individuals appears to depend primarily on third-party funding. One reason for this dependence is that most communication disabled persons are poor. Consequently, they are unable to purchase an electronic communication device because all or most of their financial resources are spent on necessary health care and support. Their physical inability to communicate with others in a meaningful way has become a double negative for many of them. It not only deprives them of an opportunity for self-expression but disadvantages them economically as well, as a result of their inability to earn income through gainful employment. With all the high-tech augmentative communication devices that are currently available, it's unfortunate that individuals who are communication disabled do not have access to them.

Lack of funds should never be the reason a communication disabled individual is denied an appropriate communication device. A critical need exists for many of these individuals from a medical, vocational, educational, and societal standpoint. Communication aids are essential on a daily basis, if disabled persons are to achieve a greater degree of independent functioning, and in some cases they may be a lifeline to survival. For example, when a person is unable to walk because his/her legs do not function, a wheelchair is considered an essential medical prosthesis for mobility. When the speech mechanism does not function adequately due to neuromuscular incoordination or paralysis, a communication aid should be provided for that person, as an essential medical prosthesis for communication. They are both vehicles for restoring a disabled person to his/her best functional level.

Communication aids are especially important if the handicapped person is going to participate actively in the educational process rather than observing; or become a taxpayer rather than a recipient of benefits from local, state, and federal programs; or achieve a degree of independent living rather than being confined to more costly institutional alternatives.

A critical need for communication devices exists, and fortunately the technology is currently available to satisfy these needs. State-of-the-art devices are available that will enable even the most severely physically disabled individual to communicate with others, through speech or graphics or both.

Since many communication disabled persons are at or below poverty level incomes, they can only look through the window at this advanced technology. They cannot touch. In many cases their only source of income is from government income maintenance programs. Even if it were possible for them to save as much as \$15 per month from their maintenance income, it would take them approximately fifteen years of saving to purchase an appropriate device.

The major income maintenance programs of the disabled are the Social Security Disability Insurance program (SSDI), the Supplemental Security Income program (SSI), and Veterans Administration compensation for service-connected disabilities and pensions for non-service-connected disabilities.

SSDI (Social Security Disability Insurance) is a federal social insurance program for persons who have contributed to the Social Security retirement program and become disabled before retirement age. Other eligible disabled persons include; those severely disabled during childhood who are the dependents of deceased, retired, or disabled social security beneficiaries; disabled widows or widowers over age 50 whose deceased spouses were fully insured; and individuals with end-stage renal disease. Individual SSDI beneficiaries receive cash payments which have no restrictions on their use. In addition to the cash payments, beneficiaries receive two other benefits — health insurance coverage (Medicare) and access to vocational rehabilitation services.

SSI (Supplemental Security Income) is a federal cash assistance program whose purpose is to guarantee needy aged, blind and disabled individuals a minimum income. It differs from the SSDI program; eligibility for SSI is based on the individual's current income status without regard to previous work or contributions to a trust fund. Most persons receiving SSI are eligible for Medicaid (categorically needy). States may elect to use more restrictive criteria

for Medicaid eligibility than SSI. However, states may elect to cover other individuals whose incomes are higher than the SSI maximum allowance but who can not afford medical care (medically needy).

Veterans Compensation and Pensions are income maintenance programs for disabled veterans. These programs have completely different bases for determining recipients eligibility than the SSDI or SSI programs. The VA provides comprehensive medical and rehabilitation services to all veterans, for both service-connected and non-service-connected disabilities.

The major publicly financed health and medical care programs serving the disabled are programs which serve able-bodied individuals as well. They include Medicare, Medicaid, and VA medical services. These programs will be discussed in detail later in this section.

At the present time, there are no government agencies or programs specifically mandated to assist individuals in funding the purchase of communication devices. Conversely, on the positive side, there are no specific mandates against funding the purchase either. Technologies which are covered must be deemed medically necessary by the medical community and prescribed by a physician. Each individual application is considered on a case by case basis.

There are no traditional private sources of funding either. Insurance companies, corporations, unions, fraternal and veteran groups, social service organizations, etc., while potential sources of funding, must also be approached on a case by case basis.

Occasionally a story in the newspaper will relate how a group of mothers held a bake sale and raised \$500.00, or a youth group sponsored a car wash to raise money for a communication aid for a needy individual. However, so many individuals need help that it is nearly impossible to bake enough pies or wash enough cars to make a dent in the overall need. An equitable, more dependable source of funding is needed.

That's what this section is all about. It contains practical suggestions on how to obtain funding; how to get started by selecting a coordinator, how to identify the most likely funding sources, and finally how to develop a funding plan with particular emphasis on supportive documentation. In short, developing a plan that has a good chance of being funded.

This section is based primarily on information that has already been published, information from representatives of government agencies and insurance companies, and from contacts with private social service organizations. Two publications deserve special recognition, as many of the ideas and guidelines expressed in these publications are included here with their permission.

The book entitled, *The Many Faces of Funding*, by Anna C. Hofmann, Market Research Analyst for PHONIC EAR INC., located in Mill Valley, California, contains numerous case histories, requirements and interpretations of public funding agencies, congressional legislation, and what is available under third-party funding. This information is a result of PHONIC EAR's many years of experience as a manufacturer of hi-tech augmentative speech devices and their interest in helping communication disabled persons obtain funding.

A booklet published by the Trace Research and Development Center for the Severely Communicatively Handicapped, University of Wisconsin, entitled, *Guidelines for Seeking Funding for Communication Aids*, written by Donna J. DePape and LaVonne A. Krause. This booklet provides a general overview of third-party funding and specific guidelines to follow when seeking funding. A resource section contains a list of possible government funding programs and national social service organizations.

For convenience in writing, depending on the particular situation, the following terms will be used to describe an individual who is communication disabled: user, patient, client, or applicant. Professional will be used to describe members of the medical, rehabilitation, educational, and social services.

SUGGESTED STEPS IN SEEKING FUNDING

Before any time or effort is spent in soliciting funding, the assessment/evaluation should have been completed, and a recommendation made as to the most appropriate communication device. The one best suited to an individual's physical, cognitive, medical, educational, vocational, and communication abilities and needs, in relation to his/her environment.

The process of soliciting funding has been organized into four basic steps. These steps are consistent with the Trace guidelines and help assure that important aspects are not overlooked.

- Step I Selecting the funding coordinator.
- Step II Deciding on a potential funding source.
- Step III Developing the funding plan.
- Step IV Funding follow-up.

STEP I: SELECTING THE FUNDING COORDINATOR

The funding coordinator may be a particular person or it may be an organization. If the person who requires funding for an augmentative communication device is in a school setting, rehabilitation facility, vocational rehabilitation program, hospital, group home, nursing home, etc., the professionals functional for the organization or program may assist in all aspects of securing the necessary funding. This would include either providing the necessary funds directly or assistance in securing funding from third-party payers. Individuals living outside of facilities and not being served by any program, face a more difficult task in seeking funding for a communication device. Generally the individuals who need funding the most, are those who are least equipped to coordinate the development of a funding plan, and then implement it. Occasionally an assertive family member has coordinated the effort and sometimes they have been successful. There is no hard and fast rule to follow in selecting the person or organization to coordinate the effort. The entire process of seeking out and approaching various people and programs within the maze of government, social service, and private organizations, can be so overwhelming to anyone unfamiliar with the procedures, or the most likely sources to contact, or how to approach them that professional help is recommended to coordinate the effort.

Interested family members can still play an integral role, and in some cases, can provide access to funding sources and/or vital documentation, but the entire funding process should be coordinated through one person or organization to avoid duplication of effort.

STEP II: DECIDING ON A POTENTIAL FUNDING SOURCE

Most articles written regarding funding usually start out by asserting ... there are many potential sources of funding. That's true, as far as it

goes, but the difficult part is generally omitted . . . finding one that is willing to fund your project. Finding the "most likely" funding source for a particular individual depends on so many factors, such as the individual's disabilities, financial status, age, the prognosis for communication, service-connected or work-related disabilities, educational and/or vocational prognosis, environment, and his/her eligibility for federal and state entitlement programs. Often the status of other family members is overlooked and should also be considered. There may be possibilities of insurance coverage through parents or spouses. More people are covered by group insurance than individual insurance, and funding potentials are greater through group insurance as they usually offer more extensive coverage. Another often overlooked possibility is membership in a labor union. Labor unions are as concerned with the health and welfare of their membership as industry and corporations. Health insurance coverage is part of labor contract negotiations and may be the most appropriate potential source of funding. Family members may also be active in any of a wide variety of organizations, that may provide funding or sponsor fund-raising efforts.

In spite of all the numerous sources of funding, the challenge is to find the one or ones that can be considered the most likely source(s). Even though an application for a communication aid is approved by Medicare or Medicaid, that does not ensure that it will be fully reimbursed. The amount authorized for Medicare or Medicaid reimbursement may be such that indigent clients needing electronic communication devices may be denied access to them, unless they have additional sources of funding to pay the remaining balance. Some professionals have found that it may be necessary to involve two, three or more funding sources, who will each agree to fund a portion of the total cost. The following Questionnaire-Applicant/Family History contains a list of suggested questions that can be used as a starting point to identify and prioritize various options. Much of this information is already on file, but since it is so important to funding it is included here.

Questionnaire-Applicant/Family History

Review of Applicant's Personal Information:

Name

Date of birth

Personal status? Single (name and addresses of parents.)

 Married (name and address of spouse.)

Living arrangement? (own home, with parents, group home, etc.)

Sources of income? Can applicant pay part of purchase? Amount?

Disability or medical diagnosis? (List all impairments and resulting disabilities.)

 Date of onset?

 Social service organizations serving this population? Has applicant had previous contact with them? Explain. Was disability result of work-related injury? Explain. Was disability military service-connected? Explain. Was disability result of an accident? Was claim filed? With whom? Result?

Education (Information needed for Voc Rehab or PL 94-142 funding)

 Attending school? Where? Grade?

 If not, highest grade achieved?

Employment

 Presently employed? Where? Hours?

 Covered by group insurance? Name of Insurance Company?

 Past employers? Who? Where? When?

Federal, state, or local entitlement programs

 Is or has applicant received benefits from any of following agencies or programs? What? When?

 (SSDI, SSI, Medicare, Medicaid, Veterans benefits, Crippled Children's Services, Voc Rehab, Education for Handicapped (PL94-142), other)

 If not, any possibility of eligibility?

Private Health Insurance? Company? Type of coverage?

Is there a primary caregiver? Name and address?

Review of Family/Spouse Information:

Employed family member?

Who? Where (Name of company)?

Group Insurance Plan? Name of Insurance Company?

Member of labor union? Which one?

Union Health and Welfare Plan? Name of carrier?

Active or retired member of the Uniformed Services?

Who? Explain.

Affiliations

Active involvement in social service, fraternal or veteran groups?

Which ones?

Close friend or relative involved? Who? What organizations?

Financial resources

Family members able to pay part of purchase? Amount?

Is family member (parent/spouse) receiving Social Security?

(Which might entitle applicant to SSDI income, Medicare, and the services of the Department of Vocational Rehabilitation.)

Once all the information regarding the individual and his/her family or spouse has been analyzed and the most likely funding sources have been identified, a decision must be made whether to file with one of the sources or several simultaneously. There are pros and cons either way. At best the paperwork takes weeks, if not months, and filing with one source could result in a loss of valuable time. On the other hand, filing with several could result in two approvals. (Miracles do happen.) Turning down funds may create misunderstandings and make it difficult to obtain funds from that source in the future. The person or organization coordinating the funding effort can make that decision at the time the plan is ready to be filed.

List of Possible Funding Sources

Federal and State

Medicare

Medicaid (Medical Assistance)

Vocational Rehabilitation

Veterans Administration

Champus (Civilian Health and Medical Program of the Uniformed Services)

Crippled Children's Services
Educational Rights for the Handicapped (PL 94-142)and(Section
504)
Insurance Companies
 Private: Group, Individual, Union Health and Welfare
Service and Philanthropic Groups
 Fraternal and Veterans Organizations
 Business and Corporate Community Programs
 Local Unions
 Social Service Organizations
 Charitable Foundations
Personal/Family Resources and Loans
 Northwestern Bell
 AT&T
 Bank Loans

Federal and State

These sources should have top priority on your list. In the case of a physically disabled person, some one or more of these agencies may be responsible for their health care. Determining which ones have provided assistance in the past provides a direction to take in applying for funding. Funding will depend upon whether a precedent has already been set, whether the administrators in the agency are aware of the specific problems of communication disabled individuals, and whether the funding plan is well documented and professionally supported. There are differences in the interpretation of regulations governing these types of requests, between federal and state programs and from one state to another.

It is sometimes helpful to know what other government agencies, in other states, have funded aids, so that this information can be passed along to the local representatives of that government agency. For example, in Wisconsin, the Bureau for Handicapped Children and Medicaid have contributed to the purchase of communication aids. In Minnesota, the Department of Vocational Rehabilitation, and Medicaid (Medical Assistance) have funded selected purchases.

Generally the securing of funds from these sources has not always produced positive results. However, a human interest story in the December 13, 1985, issue of the *Minneapolis Star and Tribune*

entitled, "Voice: People Speak Through Synthesizers", was of special interest. It related how a twenty-one year old man with cerebral palsy, who could not say full words or sentences, received partial funding for an electronic speech device. Peggy Dominic, the special project manager at Courage Center, where the man resides, said it took some time to convince the Hennepin County Medical Assistance program to agree, that the electronic speech device was a medical necessity so part of its cost could be covered.

The following federal and state agencies should be considered as potential sources of funding:

Medicare — is designed to serve eligible persons over 65 years of age, and disabled persons under 65 years of age who have been entitled to receive Social Security Disability benefits for a total of 24 months. The Medicare Program provides health insurance benefits to cover the cost of hospitalization and medical care; including services by physicians, some allied health professionals, outpatient clinics, rehabilitation facilities, extended care facilities and medically necessary drugs and devices.

Under Part A of the Medicare program (the hospital insurance program), the participating hospitals, skilled nursing facilities and home health agencies (institutional providers) are reimbursed for reasonable costs of providing medically necessary inpatient and home care visits.

Under Part B (the supplementary medical insurance program) Medicare provides insurance protection against most costs of health care to persons who elect this coverage. Participating individual and institutional providers are reimbursed for 80 percent of the reasonable charge for physician's services, outpatient hospital care, outpatient physical therapy and speech pathology services, and other medically necessary services, including drugs and devices.

Medicaid — provides a program of medical assistance for certain low-income individuals and is the primary source of health care coverage for America's poor. In general, this program provides medical assistance to the needy aged, blind and disabled receiving Supplemental Security Income (SSI), and certain other groups eligible for cash welfare payments. Medicaid is financed jointly with state and federal funds and is administered by each state within certain federal requirements and guidelines.

The Medicaid law requires that certain basic services must be included in each state program; hospital services, laboratory and x-ray services, etc. States may provide a number of other items and services if they choose to do so; including drugs, physical therapy, durable medical equipment, etc.

Medicaid is concerned with services designed to attain maximum reduction of physical or mental disability, and restoration of the patient to his/her best functioning level, and the use of such supplies and equipment as are necessary in the provision of such services.

Vocational Rehabilitation — All states have voc rehab agencies to help handicapped persons become employable, by providing a wide range of services, financial assistance, and training. Expenses covered by the programs will vary widely from case to case and from state to state. An individualized rehabilitation plan is worked out for every eligible disabled person to determine their potential skills. When it comes to recommending communication devices, voc rehab is mainly interested in how the device will enhance the individual's employability and how the person's vocational potential is increased by providing the device. Voc rehab needs assurance that the device will be effective in providing a viable means of communication. Individuals must seek information at the state and local level, rather than at the federal level.

Veterans Administration — The VA will fund any communication device medically prescribed for a person who has a service-connected disability. Should the individual have a non-service-connected disability, funding for evaluation may be obtained through the Prosthetics Evaluation Center in New York City.

Champus — (the Civilian Health and Medical Program of the Uniformed Services) is a medical benefits program provided by the Federal Government to help pay for the civilian medical care rendered to spouses and children of active duty Uniformed Services personnel, to retired Uniformed Services personnel and their spouses and children, and to spouses and children of deceased active duty and deceased retired personnel. Although Champus is not a health insurance program, it is similar in many respects to health insurance provided by private employers to their employees. Within Champus is a "Program for the Handicapped", which provides financial assistance to active duty members for the care, training, and rehabilitation of a spouse or child who is seriously physically handicapped, or moderately

or severely mentally retarded. A spouse or child of a deceased active duty member may qualify if they can meet specified requirements.

Crippled Children's Services (CCS) — is a joint federal/state program to provide medical and related services to handicapped children from birth to age twenty-one. All states must provide medical diagnosis and evaluation free for all children. (No state residency period is required before such services are provided.) The range and cost of additional treatment or hospital care services vary from state to state. All programs accept third-party payments such as Medicaid, Blue Cross/Blue Shield and other medical insurance.

Educational Rights for Handicapped (PL94-142) and (Section 504) — PL94-142 is a comprehensive law setting forth the fundamental rights necessary to ensure that all handicapped children receive the free appropriate public education to which they are entitled. Section 504 is a more general civil rights law which also applies to educational services. Section 504 makes it illegal for any agency or organization receiving federal funds to discriminate in any way against handicapped people.

The first step is to know what the regulations actually say. A copy of PL94-142 regulations (42 Federal Register 22676, et seq.) can be obtained from your Congressperson or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The Section 504 regulations (42 Federal Register 22676, et seq.) can be obtained from the U.S. Department of Education, Office for Civil Rights, 330 Independence Avenue, S.W., Washington, D.C. 20201.

It is also important to know what your state and local plans for services to handicapped people say. Each state and local school district is required to develop special education plans each year, and make them available to the public for review and comment before they are adopted.

All school districts should have copies of the two sets of federal regulations, the state plan, and the local district's own plan. You have a right to see these documents. Final responsibility for implementing the Education for All Handicapped Children Act rests with the state education agency.

Insurance Companies

Insurance companies (carriers) represent a major source of third-party funding. They act not only as fiscal agents for Medicare and Medicaid, in accordance with Medicare and Medicaid regulations, but also as underwriters of insurance programs for individuals, major corporations and trade unions. The carriers are in the unique position of processing funding through government agencies as well as private industry and individuals. Private insurance companies are slowly recognizing communication aids as prosthetic devices, just as necessary as other assistive devices that are covered items. Coverage for a communication device by a carrier depends upon the terms of the policy, its interpretation, and the medical condition that has necessitated the need for an augmentative communication system. Some insurance policies do not cover chronic conditions, such as cerebral palsy, but would cover a person injured in an accident. Some coverage is available only during hospitalization and may not cover equipment needed once the individual is discharged from the hospital. It may be possible to get around this, by securing funding for the purchase of a communication device as a medical prosthesis while in the hospital, that would not be funded after discharge from the hospital. Each case stands on its own, precedence does not affect the determination of coverage. When filing an application for insurance coverage, it is necessary to include a prescription by a physician. Additional documentation from a speech pathologist, occupational therapist or physical therapist is helpful to show need and how technology can improve the functioning of the physically impaired individual. A claim with good documentation and supportive facts will provide the insurance carrier with better decision making tools. Claims filed with unions deserve the same detailed information.

Service and Philanthropic Groups

Fraternal and Veterans Organizations

These organizations are listed as potential sources of funds depending on the circumstances, the membership, and the community in which an individual lives. In the smaller communities of the state, if the prospective user of a communication device or his/her family is known by members of the organization, and they can personally associate the

local person's needs with a request on paper; there is a possibility that they may respond in some way. Some groups may take on a special project, such as raising funds for a communication device, while others may donate money toward the purchase. Fraternal and veterans organizations' reactions to such requests may vary depending upon their specific priorities and how the individual case is presented to them. Some organizations prefer to provide community service, rather than individual assistance, but they are known for their role in assisting the disadvantaged.

The following list suggests various groups that may respond to an appropriate request for help.

American Legion	American Legion Auxiliary
Eagles	Elks
Jaycees	Kiwanis
Knights of Columbus	Lions
Masonic Lodges	Quota
Rotary	Sertoma
Shriners	Veterans of Foreign Wars
VFW Auxiliary	

Business and Corporate Community Programs

A feature article in the December 13, 1985, issue of the *Minneapolis Star and Tribune*, reported that Honeywell had donated a \$3000 electronic communication device to an eight-year old boy who attended Michael Dowling School for Crippled Children. He had lost his voice when his Laotian Hmong family was in a refugee camp in Thailand. He was only five months old at the time and contracted chicken pox and a form of encephalitis that permanently affected the part of his brain that controls speech. His new electronic speech device has a voice synthesizer that will speak words as he types them out, or will repeat common phrases he programs into the device. Other public spirited corporations, like Honeywell, may also be in a position to provide funding on an individual basis, when contacted by knowledgeable persons who can articulate individual needs and the resulting benefits.

Honeywell, Inc., is a member of the Corporate Partnership Program that was created by the U.S. Council for the International Year of Disabled Persons (IYDP.) Through this program the nation's leading corporations have undertaken initiatives to make a definite contri-

bution to the lives of America's physically disabled citizens, through employment, training, educating and supporting the physically impaired. The list includes all types of business, banks, unions, and insurance companies; who have committed themselves to participating in IYDP. A random sample of other public-spirited corporations in IYDP in this area include; Control Data, General Mills, IBM, Northwest Airlines, Prudential Insurance Co., 3M, and others. Other local companies in this community (retailers, wholesalers, banks, real estate and investment companies, the graphic industry, etc.) are active in training disabled persons, adapting their workplaces, and providing jobs for disabled persons. In some cases they may provide partial or total funding for communication devices.

Local Unions

The *Minneapolis Yellow Pages* lists 160 various state and local union offices. Some of these unions are extremely well known for their generous contributions of time and money on the state and national level, during various social service fund drives. On the local level some unions have sponsored special fund raising events, and have collected donations to aid persons in need. If a communication disabled individual is financially unable to purchase a needed communication device, and his or her family is known and respected by the members of a particular union, there is a good possibility that they may respond in some way. If a parent or spouse is a member of a particular union, perhaps the Union Health and Welfare Plan will provide funding.

Social Service Organizations

The Minnesota State Council for the Handicapped published a booklet entitled, *Organizations Of and For Disabled Persons*. It lists the names, addresses and telephone numbers of 338 organizations serving disabled persons in the State of Minnesota. While several were government agencies with multiple offices, such as Vocational Rehabilitation, many were social service organizations serving disabled persons. These organizations are probably aware of the needs of their communication disabled members, and may or may not be in a position to provide direct financial assistance in the purchase of communication devices. However, they may take an active role in advocating for funds from other community resources. Since there is

no national or state organization whose primary function is to advocate for the communication disabled population, it seems logical that a person who is speech impaired, as a result of the removal of his or her larynx because of cancer, should contact the American Cancer Society for assistance. One of "Jerry's Kids", who is communication disabled, should logically contact the Muscular Dystrophy Association, etc. A random sample of some of the organizations listed in the booklet includes:

- Amyotrophic Lateral Sclerosis (ALS)
- American Cancer Society
- Easter Seal Society
- Minnesota Foundation for Better Hearing and Speech
- Minnesota Society for the Blind
- Muscular Dystrophy Association
- Multiple Sclerosis Society
- Sister Kenny Institute
- Shriner's Hospital for Crippled Children
- United Cerebral Palsy of Minnesota

Charitable Foundations

Occasionally newspapers will publish an article regarding the distribution of charitable contributions that have been made to various individuals and groups by local benevolent foundations. In reviewing these lists, it is apparent that there are those whose interest or charter is focused on aiding the disadvantaged. These particular foundations should be considered as potential sources of funding for communication aids.

Check with your local library for *The Foundation Directory*. This directory is arranged alphabetically by state and foundations within the state. Each foundation listing provides information on the purposes and activities of the foundation, so the list can be culled without too much effort, to sort out those that provide funding for the physically disabled. The listings also provide information on when and how much they give, and the names of the foundation board and staff members.

Other Potential Sources

There are other possible sources of funds within a local community. For example: church groups, especially if there is a personal/family

affiliation; fraternities and sororities who put on fund raisers annually for humanitarian purposes; youth groups such as the Future Farmers of America.

Perhaps the local media . . . radio, TV, and newspapers will support your efforts. It takes ingenuity and effort to secure funding but the results are rewarding.

Personal and/or Family Resources

Families with a communication disabled member frequently have already faced enormous expenses for medical care, rehabilitation and other professional services, and it may be economically impossible for them to purchase a communication device for a disabled family member's use. If they do have the resources available, they may want to purchase the communication aid themselves or provide for part of the cost. If their resources are limited, or if the purchase would cause a hardship to other family members, perhaps they can play a role in assisting others in the process of securing the necessary funding.

It may also be possible in some cases, to secure a low interest or interest free loan to purchase a communication device, or extend the payments over several months provided the opportunity exists to repay the loan in the future. The following are examples of organizations that provide loans or extended billings:

Northwestern Bell — Minnesota residents with Northwestern Bell service, who are certified disabled and need special equipment to communicate by phone, may borrow up to \$1,600 without an interest charge for a term not to exceed sixty months. The equipment must be purchased by or for a disabled person for use in his/her home, and must be or work in conjunction with the telecommunications equipment. This loan program has been expanded to include micro-computers, hearing aids, and other specialized communicative equipment.

For further information, call or write:

Northwestern Bell
Room 158
200 South Fifth St.
Minneapolis, MN 55402
1-800-223-3131 (voice/TDD)

AT&T (American Telephone and Telegraph) — The AT&T National Special Needs Center has a plan where communication aids can be purchased from AT&T Consumer Sales and Service with most major credit cards. Purchases can be billed to an AT&T equipment account and payment can be spread over four months without interest charges. Available equipment includes handsets to increase the volume of an incoming voice, TDDs (the Porta-Printer Plus and the PortaView, Jr.), and Directel for severely motor impaired persons.

For additional information call:

1-800-233-1222 or

1-800-833-3232 TDD/Teletypewriter

Bank Loans

Bank loans at relatively low interest rates may be a possibility in some communities. If the nature of the purchase and its beneficial effects for the individual are fully explained, perhaps local bank representatives may work with the individual or family to provide a long-term, low-interest loan as a community service.

STEP III: DEVELOPING THE FUNDING PLAN

The lack of funding has been, and continues to be, the primary reason that more communication disabled individuals are not using communication devices. As a member of the communication disabled population, it is almost unbelievable that anyone could deny or withhold funds so badly needed by severely physically disabled individuals. However, from a positive perspective, it may well be that administrators of agencies or programs who may be potential sources of funds, are not totally aware of the difficulties and the problems that continuously confront communication disabled individuals, or the technology that is available to satisfy their communication needs. This is not surprising, when even the communication disabled population and the professionals who have direct involvement with them, are sometimes unaware of this technology or the specific requirements that must be met to qualify for funding. One of the reasons for the inability to get funding, as evidenced by a review of the case histories included in *The Many Faces of Funding*, has been ineffective and/or incomplete presentation of data that meets the requirements of a particular agency or program. The major focus of this section will be directed toward

developing funding plans designed to obtain funding from federal/state agencies and insurance companies. It's highly unlikely that such a detailed, systematic plan would be required in seeking funding from the private sector. However, as one professional put it, when you are asking for money, the giver is entitled to a sound, compelling reason.

Sound, compelling reasons are often not adequately supported from a medical standpoint, and as a result a request is denied. The following reasons have been given for a denial:

- "Insufficient proof of medical necessity."
- "The device does not meet the definitions of medical equipment."
- "It is not medically necessary for the treatment of a disease, injury, or condition."
- "Medicaid does not pay for this procedure for your condition."
- "Medicaid funds cannot be used because it is not essential to improve (user's) medical condition."
- "It is an educational device which is not authorized by (law)."
- "Device was not prescribed by a physician."
- "Not a Medicaid approved prosthesis."
- "It is not an item of durable equipment or prosthetic."
- "It doesn't meet the prevailing community standard."

Fortunately, many of these denials were reversed; by submitting the required professional documentation, or at a requested hearing on the application. These denials were included here to emphasize the prime importance; of knowing the requirements and definitions of terms used by the funding agency or program, of providing good medical support and documentation, and of anticipating and answering any standard denial reasoning when preparing the request for funding.

Terminology and Definitions

Complete documentation, that responds to various interpretations of the law or various coverage provisions of an insurance policy, is absolutely essential for filing with Medicare, Medicaid, and insurance companies. The key is to know and understand their requirements and terminology and write the supporting documents accordingly. The following information was taken from *The Many Faces of Funding*, published by PHONIC EAR INC.

Medicare

Medicare has two major classifications of (covered services, supplies and equipment) that can be applicable to some communication prostheses. By knowing how Medicare defines these classifications, they can be addressed with a more positive approach.

- Rental and purchase of "durable medical equipment"
- "Prosthetic devices"

"Durable medical equipment" is covered if it meets the definition of durable medical equipment and if it is "necessary and reasonable for the treatment of an illness or injury or to improve the functioning of a malformed body member."

Terminology:

Definition of "durable medical equipment":

1. Can withstand repeated use.
2. Primarily and customarily used to serve a "medical purpose".
3. Generally is not useful to a person in the absence of illness or injury.
4. Appropriate for use in the home.

(Even if an item is not "primarily and customarily used to serve a medical purpose" (2), and/or "generally not useful in the absence of illness or injury" (3), it can still meet the definition of "durable medical equipment" if it can be clearly shown that it serves a therapeutic purpose in the individual case.)

"Medical purpose" may be determined by opinions of local medical organizations and specialists in the field of physical medicine and rehabilitation.

"Medical necessity" means evidence exists that the item is included in the physician's course of treatment and a physician is supervising its use.

"Necessary" means that the item can be expected to make a meaningful contribution to the treatment of illness or injury or to improvement of a malformed body member.

"Reasonable" takes into account the following:

1. Is expense disproportionate to the therapeutic benefits?
2. Is the item more costly than an alternative?
3. Does the item serve the same purpose as equipment already available to the beneficiary?

(If #2 is true, Medicare will only pay the cost of the alternative.)

"Prosthetic devices" are covered if they replace all or part of an internal body organ or replace all or part of the function of a permanently inoperative or malfunctioning internal body organ.

These are the key areas you must address when filing for funding. Respond to these key areas . . . make Medicare your ally.

Medicaid

Except for certain required basic services, states may provide a number of other services if they elect to do so. Therefore, Medicaid programs differ widely from state to state. Optional benefits that may be provided are:

- Prescribed drugs, dentures, and "prosthetic devices", and eyeglasses prescribed by a physician.
- "Other services" such as diagnostic, screening, and preventative and "rehabilitative services."

Terminology:

"Prosthetic devices" — includes hearing aids. FDA regulations require examination by licensed physician (preferably ear) for accurate diagnosis of need for hearing aid. Some states recognize audiologists and hearing aid dealers as "other licensed practitioners." Some states require both physician and audiologist. **"Other services"** — Diagnostic, screening and preventative services are those provided by the physician in the practice of the healing arts.

"Rehabilitative services" — include any medical and remedial items or services prescribed for a patient by his physician or other licensed practitioners of the healing arts, within the scope of his practice as defined by State law, for the purpose of maximum reduction of physical or mental disability and "restoration of the patient to his best possible functional level."

Insurance Carriers

It appears that even the insurance industry looks to Medicare for some of its guidelines. An agent for one of the major insurance carriers advised that the medical item must be able to pass three tests:

1. Condition of patient must be result of illness or accident.
2. Must be prescribed by a physician.
3. Must be one of the "covered charges" of the policy.

"Covered charges" — are spelled out in a policy with a catchall "other therapeutic and prosthetic services and supplies."

Terminology:

Must be "prosthesis to replace organ or limb."

Must be curative or "improve condition of patient."

Champus also refers to the same terminology as Medicare, must be "medically necessary" and a "prosthetic device."

General Suggestions

It may be helpful if the coordinator of the funding plan shared these definitions with the other professionals who are preparing supporting documents. This should help to assure that the funding plan addresses the specific requirements of the funding source.

Terminology to keep in mind:

Medicare:	Medical necessity Necessary
Insurance:	Improve condition of patient
Medicaid:	Restoration of the patient to his best functional level.

There is no standard form to follow. There is no special length of application, or arrangement of data that appears to be more successful. It is interesting to note that Anna Hofmann, in one of her monthly newsletters, related how one application filed with Medicaid was twenty-two pages long, thorough, and systematically detailed. Medicaid approved funding one week after the application was filed.

The following basic outline for developing a funding application is not intended as a 1, 2, 3 comprehensive plan, but as a source of ideas and a starting point in the development of an individualized plan.

Basic Outline for Developing the Application

Background Information:

- Review of pertinent personal data, including education, financial status, history, environment, etc.
- A statement of purpose (purchase of a communication prosthesis)

Medical Prescription:

Since Medicare and Medicaid are medically directed programs and insurance companies require a doctor's prescription to justify a claim, a medical doctor is the key person in filing these applications.

- In-depth medical diagnosis of the individual's specific medical condition.
- Detailed assessment of the individual's functional skills and limitations.
- Assessment of the individual's prognosis for communication.
- Statement regarding the need for an electronic communication device.
- An outline of the expected benefits the communication device will have on restoring the individual to his/her best functional level. For example; taking care of medical needs, attending school, seeking employment, achieving partial independent living, self-care, and the beneficial effect on family, therapists, teachers, etc.
- Expected duration of the use of the device, or lifetime. (UCP of California recommended that a statement should be added such as, "This medically necessary prosthesis for support of this patient's optimum function will replace, or partially replace, organic loss of function due to disease, trauma or congenital disability.")

Supporting Documentation:

- Supporting assessments reaffirming the medical prescription by qualified professionals who have evaluated the individual. For

example; physician, neurologist, physiatrist, pediatrician, speech language pathologist, occupational therapist, physical therapist, registered nurse, special education teacher, social-worker, etc.

- Focus should be on the definitions used by Medicare and Medical Assistance as they apply to the individual and the professional expertise of the person writing the document.
- Emphasize the benefits that can be expected from using the device from the perspective of the funding source such as medical, vocational, educational, and insurance companies.
- How the use of the device may reduce the costs associated with rehabilitation.
- A statement from the individual and/or family as to the critical need for the device may also be appropriate.

Description of the Communication Device:

- Special features of the device as they relate to the individual's particular needs.
- Printed product brochure or literature.
- Name and address of the manufacturer or distributor.
- Price and terms of sale.

Conclusion

- Review all major points with reference to supporting assessments.
- Ask for approval

Denials . . . Appeals

As the once popular song goes, "You can't have one without the other." Denials are a "way of life" with public services. Agencies and programs frequently turn applications down. Consultants employed to assist the third-party payers in their decisions rarely have experience with rehabilitation and do not fully understand its function. As a result, funding is often denied rather than justified. Never accept a denial. File for a hearing, and a rehearing if necessary. Pursue the reasoning behind the decision. Although there are numerous other reasons for denial of funding, medical prescriptions that are not detailed are often initially denied or referred for follow up. Carefully detailed physician prescriptions may, and have, assured funding.

All agencies and organizations have a hierarchy. When an applicant exercises his basic right for a review or for a hearing, the application will reach the next responsible level in that agency. It is important that the top decision-makers become aware of the critical needs of communication disabled persons for augmentative communication devices.

After thoroughly reviewing the reasoning behind a denial and taking the appropriate action to answer the objection, if the application is again denied, enlist support. Perhaps additional professional support is needed or perhaps the individual is entitled to be represented by an attorney from the Legal Aid Society to present the case. In addition, the applicant's family members should contact their senators and representatives in Congress for help. Generally they will take action to investigate a constituent's problem. They also become aware of needs that are not being met and may as a result of this awareness support the Handicapped Independence Assistance Act. (See page 142.)

STEP IV: FUNDING FOLLOW UP

Once a third-party payer (public or private) agrees to provide the funding for a communication device, or if co-insurance is involved and another funding source has agreed to fund the remaining balance, or if several organizations have each agreed to fund a certain amount of the total cost, all the financial details must be confirmed to all of the parties involved, including the manufacturer or dealer.

A letter of thanks to the funding agency(s) is certainly in order. If possible, from the person who received the funding, otherwise from the coordinator or a family member. Most people like to know that their efforts were appreciated, that the device was received, and that it is being used with positive results. Such a letter also has the secondary effect of helping to pave the way for other individuals to secure funding in the future.

Summary

Funding is the essential element in the use of communication devices by disadvantaged individuals. Soliciting these funds is not an easy or simple task, as anyone who has done it will attest. There are no

"traditional" sources that can be relied on. Each individual request presents a new challenge, and requires considerable time and effort by the person responsible. Until new alternative methods of funding are developed, considerable ingenuity will be needed to develop a funding plan that meets the requirements of the funding source and positive and determined effort will be required to obtain the money. As more and more successful applications emerge and the benefits become more widely-known, perhaps a traditional funding source will become a reality.

PART VI

TRENDS AND CHALLENGES

"If we are willing to accept things as they presently are, we then become the major barrier to change."

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As I review the total picture (medical, educational, psychological, vocational, societal,) from the perspective of forty years of personal experience as a communication disabled consumer living in Minnesota, there is reason to be optimistic about the future of augmentative communication. However, despite the examples of individuals whose lives have been improved, the application of high-tech still has a long way to go before it will make a real impact on the present communication disabled adult population.

We need a dependable source of funding for augmentative communication devices; funding for professional assessments/ evaluations to ensure the selection of the most appropriate device; and funding for the training so essential to developing the skills needed by a disabled person to get a job. Progress, while extremely slow from a disabled person's standpoint, will be made as decision-makers become aware of the capabilities of disabled persons, rather than continuing to focus on their disabilities. At the present time, however, third-party insurers, including Medicare and Medicaid, generally do not deem sensory aids as medically necessary and reimbursable as durable medical equipment. When Medicare and Medicaid recognize the need for, and benefits of, sensory aids coverage (hearing, speech, and sight), other third-party insurers who look to them for direction will begin to provide this coverage. This could mean that a child with a severe speech impairment could use an augmentative device and communicate more easily and readily with his friends and teachers, bridging the gap between what he knows and what he can express. A severely physically disabled adult unable to use his head or arms for functional tasks, entirely dependent on another to control his environment, could use an environmental control unit to operate electrical devices, an emergency call system, and a telephone. These applications would probably reduce the number of hours required for attendant care and special educational services. Augmentative communication devices provide the means by which disabled persons obtain a job and achieve independent or semi-independent living, which in turn, results in decreased expenditures for assistance by government agencies, reduced disability payments and increased federal, state, and local tax revenues.

The future outlook for mandated funding under Medicare and Medicaid is most encouraging, as evidenced by the efforts of some Congresspersons who have recognized the critical needs of communication disabled individuals. Legislation has been introduced in the

Senate by Senator Spark M. Matsunaga of Hawaii and in the House of Representatives by Representative George E. Brown, Jr. of California, and is co-sponsored by other Senators and Representatives, to amend the Social Security Act, to treat certain sensory (hearing, speech, and sight) and communication aids as medical and health services, reimbursable under Medicare and Medicaid. The following excerpts are from the Handicapped Independence Assistance Act (H.R. 1432) that was introduced in the House of Representatives by Representative George E. Brown, Jr.:

"The increased availability and use of technologically advanced sensory and communication aids, equipment, and devices — by individuals who are blind, severely visually impaired, deaf, severely hearing impaired, or vocally impaired — would reduce the handicaps of such individuals with respect to employment, education, and self-care. Such sensory and communication aids, equipment, and devices, would open many new job opportunities for their users, but are beyond the financial means of many such individuals.

Although payment for such aids, equipment and devices is not expressly prohibited by statutes authorizing federal health insurance programs, regulations of both federal and state agencies result in widespread denials of such payments.

Wider acquisition of such aids, equipment, and devices by persons with disabilities would benefit the national economy, disabled persons, and their families through increased employment, independence, and improved education for such persons, and is therefore in the national interest."

A real need exists for all disabled persons, their families, friends, and relatives to become actively involved in the political process at both the federal and state level and support those persons who know and understand the problems of the disabled and are willing to help. Now is the time to write your two senators and representative in Washington and encourage them to support the Handicapped Independence Assistance Act, when it comes to the floor in Congress.

Eventually, Congress will pass the Handicapped Independence Assistance Act, as it is morally right. Then, for the first-time, many communication disabled persons will have access to a communication device and will be able to obtain a better education, an income producing job, and independent or semi-independent living.

* * *

On the cover of the May, 1986, *Minnesota Radio Talking Books Calendar*, there was a picture of a very distinguished appearing young man, immaculately dressed, with a large sign hanging around his neck which read, I AM DEAF-BLIND. PLEASE HELP ME TO GET OFF AT SNELLING AVENUE. THANK YOU! My immediate reaction was really a question. What space-age advancements in technology will help this deaf-blind person to get rid of that sign? Information from In-Touch, Inc., a private non-profit corporation founded to increase the opportunities for deaf-blind persons to become more self-sufficient and independent, indicated that there are approximately 35,000 deaf-blind persons nationally, and that there are very few augmentative communication devices that meet their needs. Perhaps, the exciting new partnerships that are evolving between high-tech corporations, the government, various organizations, and individuals who are disabled, will meet this challenge and those of other communication disabled persons by identifying specific needs that are currently not being met or inadequately met. Then through pooling and directing their talents and knowledge, address these needs.

A news article in a Fall, 1985, *Progress Report*, a publication of the American Physical Therapy Association, entitled, "High Technology For Disabled Supported By Aerospace Groups," reported the following:

"Aerospace industry leaders have joined the Federal government in a national initiative to bring high technology to work for the disabled.

Many of (the disabled's) problems can be solved . . . by a transfer of technology which meets their individual needs," said the Secretary of Health and Human Services (HHS), in announcing the initiative in July. The partnership among HHS, the National Aeronautics and Space Administration (NASA) and aerospace industries will meet those needs.

The initiative will address the problems of communication, life-support, transportation, and movement encountered by the disabled. The initiative's efforts are directed primarily to people whose disability has isolated them from the outside world."

It is in these areas in particular that a national initiative of this magnitude is sorely needed. This partnership among HHS, NASA, and aerospace industries has the potential to develop solutions to meet

those needs. The initiative's executive committee consists of high-level executives from such prestigious corporations as LTV Aerospace and Defense Company, Boeing, Lockheed, Martin Marietta, General Motors and Rockwell International. They are coordinating the efforts of corporations, and raising money for the project. "Tech Teams" of engineers, scientists, researchers and other professionals who have put men on the moon, leave little doubt that they have the capacity to provide the technology to help even the most severely physically disabled persons to come out of isolation and communicate with the outside world.

* * *

Exciting progress is also being made by the voice recognition industry. According to an article in *USA TODAY*, April 8, 1986, entitled, "Voice-Control Makers Say It's Time Has Come", relates how Votran of Fremont, CA., is supplying voice-control technology to a car manufacturer. By 1988, they expect voice-control to turn car radios on or off and control the volume, dial a mobile phone by reciting the numbers, and set temperature controls or windshield-wiper speeds. Robert Russo, Votran vice president, said, "Such applications are just a start, over the next 18 months this industry's really going to blossom. This is Star Trek time." This technology has enormous applications for the communication disabled population, especially if the computer can be "trained" to recognize the user's unintelligible speech, even when it is not generally "understandable" to others. The disabled population is indeed fortunate, whenever applications for the industrial environment or the non-disabled population coincide with their communication needs.

* * *

It has been exciting to see the rapid development and upgrading of portable, battery-operated devices, that range from very basic, for persons with limited capabilities or needs, to sophisticated devices with practically unlimited capabilities. The manufacturers of these devices have accepted an enormous challenge, as the variable needs of disabled individuals often make the production of standardized communication devices difficult. This results in a very limited market for a particular device and the costs associated with research, development, production, and marketing, must be spread over a relatively small number of sales; unlike the mass-marketed items that are sold by the tens of thousands of units per month. As an interesting side-light, one

major manufacturer reported that the number of augmentative communication devices made by all manufacturers in all their years of business, is less than the number of personal computers made in a single day. While this tends to confirm the trend toward an information-based society, it also confirms the small allocation of technological resources to the disabled population which, in turn, deprives them of the opportunity to also have access to this advanced technology. So, instead of technology being the catalyst to narrow the gap between the disabled and non-disabled populations, without access for the disabled population, it tends to widen the gap. However, in spite of the high-cost and limited market, it appears that manufacturers are currently marketing augmentative communication devices that challenge the educational, social, medical, and vocational service systems, to develop a way to provide access to these devices by more communication disabled persons to improve their quality of life and narrow the gap with the non-disabled population.

* * *

While gathering information for this book, it became apparent that the educational systems in this area are fast becoming forerunners in the application of innovative communication technology. The public school systems, especially in the more progressive school districts, are providing children who are communication disabled with specialized training in the use of augmentative communication aids. An excellent example of this specialized training appeared in the *St. Paul Pioneer Press and Dispatch* on Sunday, April 20, 1986. The following excerpt was taken from a feature article entitled, "Therapist Gives Disabled Kids Hope,"

"Sooner or later, many East Metro school kids with cerebral palsy, quadriplegia or other major physical disabilities find their way into Frank Kurkowski's workshop at Humboldt Junior High School.

It often turns out to be the break of a lifetime, according to Kurkowski's colleagues, and the parents of his students.

Kurkowski is an occupational therapist who specializes in using computers to handle hard cases; kids who can't speak or control hand, arm or head movements.

'I don't think any other school district has a Frank Kurkowski,' said an admiring Charles Hagen, director of special education for the St. Paul school district. 'He's like a

treasure we have in St. Paul. Because of his unique skills he does things for those kids I don't think are getting done anywhere else.'

'His kids are all normally bright or above average, they have a lot of brain power going for them, if it can be unleashed. What Frank has been able to do so well is unlock them, make it possible for others to interact with them. Communication is so essential . . . for some of these handicapped kids it's the most important thing we can do for them.'

Humboldt Junior and Senior High Schools are the district's secondary level programming centers for the physically impaired. About 50 such students now are enrolled there, including many from other areas that reimburse the St. Paul district. They attend "mainstream" classes as well as sessions designed to teach them how to compensate for their disabilities."

Training like this is essential if these children and young adults are to actively participate in the educational process, rather than merely "put in time" passively observing classroom learning activities. By using augmentative communication devices, under the supervision of special education professionals like Frank Kurkowski, they have the opportunity to concentrate on up-grading their capabilities and skills rather than being limited by their disabilities.

"According to Deanne Magnusson, coordinator of special education speech and language programs, Minneapolis Public Schools, there are 150 children in the system who need equipment to help them speak." (*Minneapolis Star and Tribune*, December 13, 1985.) "Her department is diagnosing student needs and surveying the rapidly expanding computer market to see what can be used to fit those needs."

This in-school training with communication devices also tends to increase the awareness of parents, as to the benefits of these devices to further their child's growth and development; and accelerates the use of these devices in the home.

The Office of Transition, funded by the 1985 Minnesota legislature within the state Department of Education, is working to ease the transition from school to work settings for teenagers who are disabled. Other transitional programs are being offered through the joint efforts of the Division of Rehabilitation Services in the Department of Jobs and Training and in Centers for Independent Living in the Twin Cities,

Rochester and Marshall.

Universities and colleges in this regional area have taken an active role in various aspects of augmentative communication. Most notably, the Trace Research and Development Center for the Severely Communicatively Handicapped, at the University of Wisconsin-Madison. Some universities and colleges have established special needs centers with a support staff and the electronic equipment necessary to enable even severely communicatively disabled individuals to productively attend school.

Advocacy organizations such as PACER (Parents Advocacy Coalition for Educational Rights), a Minnesota coalition of eighteen disability groups, provides additional emphasis on special education for children who are disabled.

Private organizations such as the Closing the Gap Training and Resource Center in Henderson, Minnesota, offer workshops, seminars and personalized hands-on training and counselling to professionals, and others who wish to implement the application of microcomputer technology in special education and rehabilitation. CTG's Professional Development Summer Series Workshops are designed to provide special education and rehabilitation professionals with practical and effective techniques and information for incorporating commercially available computer technology into practice.

* * *

As Helen Keller once said, and I'm sure she wouldn't mind my expanding it to include all disabled persons, "The greatest barrier to disabled people is not their disabilities but the attitude of other people." This is so true. Attitudes change so slowly, especially among the older population. Those of us in the Midwest area have been encouraged by the attention that has been given to communication disabled persons, who are using augmentative communication devices, by the major metropolitan newspapers and the electronic media. This very favorable publicity should help acquaint the general public with our capabilities, and the benefits we receive when we have access to a communication device. As the public becomes more aware of our capabilities rather than our limitations, more favorable public attitudes will emerge.

* * *

Governor Rudy Perpich of Minnesota, recognized that a wide gap existed between technological devices and the access to them by persons with all types of disabilities. The Governor's response to this

problem was announced at the Governor's Conference on Disability in October, 1985. At that time, Perpich announced the formation of a 19-member Issue Team on Technology for People with Disabilities, to develop an action plan to create awareness and provide access to technological devices for persons with disabilities, and to address the issues involved with funding these technological devices.

Governor Perpich is excited about these new technological advancements, saying, "I am convinced that thousands of Minnesotans with disabilities could have their lives greatly improved by technologies which currently exist, or by technologies which we have the capability of developing. It is our moral and economic responsibility to do all that we can to get it to them."

The Issue Team on Technology for People with Disabilities has now published their report (*Governor's Report on Technology for People with Disabilities: State of Minnesota, June, 1986.*) In my opinion, the report is very thorough and addressed to varying degrees, the concerns I heard expressed by professionals, manufacturers, disabled persons and their families, during the two years of collecting information for this book. The Issue Team concurred with the five action steps toward the goal of providing access to technology for all persons with developmental disabilities and functional limitations, that were outlined by the Governor's Planning Council on Developmental Disabilities in March, 1984.

1. develop and implement a state policy agenda for the use of technology by people with disabilities in Minnesota;
2. increase awareness of technological advancements among persons with disabilities and their families, professionals, policymakers and the general public;
3. train professionals from a range of disciplines on the uses of technology for persons with disabilities;
4. provide access to adequate assessment, prescription and follow-up services for individuals with disabilities who need technological aids;
5. modify funding mechanisms to allow the purchase and maintenance of technological aids and related support services.

In addition, the Issue Team made twelve recommendations, that provide the means to achieve these five goals which, given sufficient funding and staff support, could be implemented within a two/three year time period. These twelve recommendations are very promising

from the standpoint of a communication disabled person, as well as all disabled persons in Minnesota. Since the Governor's Report is published and it's free, all of the recommendations made by the Issue Team are not included in this book. However, it was very encouraging to see that they addressed the need for an on-going Advisory Board to provide the follow-up that will be required to change these recommendations into reality.

Ms. Rachel Wobschall, Chairperson of The Issue Team, noted in the summary statement of the report the forward-looking, positive approach taken by the 19-members of The Issue Team in outlining their recommendations. The first two paragraphs are included below:

"The next five to ten years are critical to the shape of our future. Action must be taken to share information; fund training, application and access efforts; and carry out ongoing research and development that expands on the promise of technology for people with disabilities. The costs of doing so will be far outweighed by savings in productivity, economic growth, human dignity and well-being.

We cannot afford to lose this opportunity to lead the nation in applying new technologies to enable persons with disabilities to pursue productive, skilled employment; discover their talents and gifts; enjoy social and recreational opportunities in a way not possible without technology. Minnesota's economy has prospered from a strong high technology industry, and one of the most outstanding medical service and research communities in the world. Our workplaces encourage the entrepreneurial spirit, a tradition of cooperation between business, government and the arts. We have a tradition of civic pride that is based in our shared concerns for each other."

Free copies of this report are available from: Developmental Disabilities Program, Minnesota State Planning Agency, 201 Capitol Square Bldg., 550 Cedar Street, St. Paul, MN 55101 (612) 296-4018 (612) 296-9962 TTY

* * *

Another very positive development for many communication disabled individuals, as well as public funding agencies, has been the implementation of the independent living movement. Several severely physically disabled individuals in this area, who have gained self-

expression through the use of communication aids, have been able to assume greater independent control over their lives and have moved into independent or semi-independent living arrangements. Lake Kissick provides a good example. His disabilities were so severe that his doctor told the family he would be a "vegetable" for the remainder of his life and should be institutionalized. With the aid of an augmentative communication device and electric wheelchair, Lake lives in his own apartment and is a dealer for the Prentke Romich Company. (See Practical Applications and Summary.)

In addition to improving the quality and equality of life for disabled individuals, like Lake Kissick, it takes only simple arithmetic to make a comparison between the high cost of institutionalized care versus more independent living situations that are often made possible through the use of augmentative communication devices or services.

PLACEMENT	1985*		SAVINGS OVER INSTITUTION	
	COST/DAY	COST/YEAR	1-YEAR	5-YEAR
Foster Care	\$12.00	\$4,380	\$35,588	\$177,940
Semi-Independent Services	24.82	9,059	30,909	154,545
Community Intermediate Care Facilities	49.97	18,239	21,729	108,645
State Hospital	109.50	39,968	0	0

*(1985 Cost/Day from Governor's Report on Technology for People with Disabilities: June, 1986.)

An analysis of these figures, leaves little doubt that the short-term cost of funding these advanced technological devices and services, that may enable an individual to function in an environment other than an institution, is small compared with the long-term savings that result from independent or semi-independent living. Optimistically, the possibility of achieving such significant savings should accelerate the application of the current public policy toward community home-based health care, and hasten the funding for augmentative communication devices and other technological devices and services.

* * *

There are so many social service organizations, so many needs, and so little time and money available, that some individuals who are communication disabled fall through the cracks in the system. Some who were interviewed for this book felt that the possibility of their getting an appropriate communication aid was remote. Perhaps, part of their dilemma stems from the fact, that traditionally they have been

categorized into various social service delivery systems based on their impairment or disease. For example: the blind, the hearing impaired, cerebral palsy, muscular dystrophy, amyotrophic lateral sclerosis, to name just a few. Many of these individuals have multiple impairments and are eligible for inclusion in several social service organizations.

Deborah Crouch McKeithan, Chairman of the Board of Handicapped Organized Women, in an article in *Disabled USA* wrote, "And what about females like me who have a variety of handicaps. I am eligible for membership in the Multiple Sclerosis Society, the Association for the Blind, Epilepsy Foundation, National Spinal Cord Injury Foundation, and the Stroke Club; none of which really meets all of my needs or expectations." Often the same holds true for communication disabled individuals with multiple impairments. While all of the organizations that were contacted expressed a desire to try to provide help and guidance to individuals who are communication disabled, only a very few were actually equipped, even in a limited way to serve their needs.

In October, 1982, following the Office of Technology Assessment (OTA) report on *Technology and Handicapped People*, discussion groups made recommendations on various subjects that were called Barriers That Could/Should Be Made Into Goals. One Barrier discussed was:

Lack of Organization Within the Disabled Community

- Apathy of handicapped community
- Lack of alliance with Aging lobbies or Veterans Administration who are very effective
- Handicapped not in "inner circle" (old boy network)
- Unrecognized commonality of interests
- Internal competition

The need is so great and there is such massive fragmentation and so little political power inherent in so many diverse organizations "doing their own thing", that perhaps a coalition of organizations to advocate for communication disabled individuals, regardless of the diagnosis, needs to be developed. It would appear to be good business to combine the strengths of several organizations when there are so many essential functions: legislative (passage of the Handicapped Independent Assistance Act), public education, advocacy, funding, etc., that can be more effectively and efficiently performed by a group effort rather than trying to "go it alone".

Perhaps, alliances with others just happen. For example, an article in the June 15, 1986, *The Many Faces of Funding*, monthly newsletter, reported that RESNA (Association for Advancement of Rehabilitation Technology) in a review of the report, *Hearing Impairment and Elderly People*, a major study by the Office of Technology Assessment, said:

"Whether we approve or not, policy and resource allocation for rehabilitation services and assistive devices for older, functionally limited Americans and for younger disabled Americans is clearly connected, and whichever group precipitates a change, BOTH GROUPS WILL BENEFIT (or suffer)."

In Minnesota, handicapped parking and Metro-Mobility were both precipitated by the handicapped community. It was amazing how fast the aged became handicapped to take advantage of these opportunities. Perhaps the aged and disabled populations have much in common and can support each other for the common good of both. We both need all the help we can get.

* * *

A very positive step is currently underway at the Vocational Studies Center at the University of Wisconsin-Madison to identify income-producing jobs that are being performed by individuals with all types of disabilities, ranging from mild to severe. The objective of this project is to develop a description of various jobs, to assist others in the disabled population to replicate these jobs in a similar work environment. An area that would appear to have considerable opportunities for the employment of disabled individuals may be the rapidly expanding area of electronic information processing. As the country moves from an industrial-based to an information-based society, employment opportunities will change to higher skilled jobs where hi-tech devices replace physical labor. The *Governor's Report on Technology for People with Disabilities: June, 1986*, addressed this area as follows:

"Education and training will increasingly hold the key to the future employment of persons with disabilities in another way as well. Estimates are that by 1990 there may be

eight keyboards for every ten employees in many company offices (Honeywell, internal study, 1985). Some technologies are replacing whole job categories, as word processors render some secretarial functions unnecessary, data bases replace file clerks, and source data collection eliminates the need for keypunch operators.

Adequate, broad-based training in skills necessary for a technology-driven workplace will make available the employment opportunities people with disabilities need."

Computers have already become standard operating equipment in many companies, and the job opportunities that revolve around the use of computers by the business community in word processing, accounting, data management, inventory control, graphics, etc., are practically unlimited. It is encouraging to note that over half of the communication devices (Described in PART IV) are capable of accessing computer systems. Disabled persons with access to these electronic devices, even home-bound individuals, have the "tools" to communicate directly with an employer's workforce. While the benefits of hiring the handicapped are generally well-known, additional emphasis needs to be placed on those who are home-bound⁴ and isolated from society. A computer and a modem in the home and office is the link that makes employment possible for many who would otherwise be excluded from the workforce. A commentary in the *Minneapolis Star and Tribune* on July 29, 1985, entitled, "Telecommuting Offers Workers Promises, Pitfalls," addressed the issue of home employment. The following excerpt is from that article.

"Telecommuting offers the possibility of lower overhead for employers. In some cases companies might save more than \$8,000 in rent and other expenses, per telecommuting worker over five years, (compared with the same person working downtown in space rented for \$20 per square foot).

Prime downtown rents are now pushing past \$35 a square foot in Washington and some other cities. Banks, insurance companies, consulting firms, law offices and many other employers could reduce the office space — and therefore their rents — if workers labored at home.

Telecommuting might even help trim the national debt. Already the California equivalent of the U.S. General

Services Administration is mapping out a 200-person telecommuting experiment. And for five years the U.S. Army in St. Louis has been letting a few civilian workers use terminals to work from home.

Telecommuting is no panacea. Most work requires face-to-face contact. Many workers need water-cooler gossip. But Jack Nilles, the coiner of the word "telecommuting", says that ten million Americans could be telecommuting full or part-time by 1990 from home or neighborhood centers. Many might use computers, others pencils and telephones."

That is an exciting forecast because if Jack Nilles is only 10 percent right, that is still a lot of home-based jobs. Many of these telecommuting jobs will involve the use of hi-tech devices and could be performed by persons with disabilities who have the necessary skills to operate them. These devices feed on input and often it's not important whether the operator talks or walks or sees or hears very well; what is important is that the operator has the skills that enable these advanced technological devices to do more, in less time, and more effectively. Existing technology has provided employers with a tremendous opportunity to reduce their costs of doing business, and disabled individuals with an opportunity for full or part-time employment. To an employee, telecommuting results in considerable savings in transportation, parking, office clothes, and the usual daily expenses incurred in the work place. Whether a person travels to the place of employment or works at home is a moot point. What is important is that disabled individuals who have the necessary skills, have the opportunity to work.

Some encouraging progress has already been made and telecommuting could very well be the coming trend for the future. With the rapidly accelerating role of computer technology in business and government, it appears that communication disabled individuals will have much greater opportunities for employment.

* * *

Perhaps the title of this book, *EXPRESS YOURSELF-Communication Disabilities Need NOT Be Handicaps*, made some people wonder what that woman is talking about. I'm talking about forty years of experience as a severely physically disabled individual, whose only hope of ever effectively communicating with others is

through the use of augmentative communication devices. This entire book, all 192 pages, was inputted one letter at a time into an augmentative device (computer), and the disks were used to set the type. Fortunately, computers are unable to distinguish between disabled and non-disabled operators, so I like to think that I was not handicapped at my workplace when writing this book. Or was I?

I have been very impressed with the unbelievable progress made by some severely communication disabled individuals, using augmentative devices. I think of Rick Creech's accomplishments (Title page, PART IV), and nearer to home, at what Lake Kissick has accomplished through the use of augmentative devices. (PART II)

Since I know Lake personally, I'd like to share some thoughts on him. His only means of communicating for the first ten years of his life was to point with his eyes, shake his head yes or no, or stick out his tongue. He is now a dealer for the Prentke Romich Company, a manufacturer of augmentative communication devices. Equipped with his electric wheelchair with his Light Talker attached, he wheels into conference exhibit halls and demonstrates and sells PRC communication devices. A non-disabled professional salesman said, after watching Lake demonstrate the Light Talker to a prospect, "Who could be more effective than Lake in describing the benefits of that device?" Lake also publishes a quarterly newsletter, *The Disabled Challenger*. (See PART VII, Resources, for information and address.)

Society will say Lake Kissick is severely handicapped. At a marathon, golf course, or dance hall — maybe — but in the environment in which he operates his business, some competitive sales reps might feel that he has a slight advantage.

With

- greater public and professional awareness,
- a more centralized source of information,
- increased professional and user training,
- dependable funding sources,
- and more vocational opportunities,

we shall overcome!

EXPRESS YOURSELF

A communication disability need Not be a handicap.

PART VII

RESOURCES

"The following Resources are not comprehensive lists, but are limited to those contacts and publications that were used in compiling the ideas and information contained in this book."

**MANUFACTURERS AND DISTRIBUTORS
OF COMMUNICATION AIDS**

**ADAPTIVE COMMUNICATION SYSTEMS,
INCORPORATED**

P.O. Box 12440
Pittsburgh, PA 15231
(412)264-2288

ADAPTIVE PERIPHERALS

4529 Bagley Avenue N.
Seattle, WA 98103
(206)633-2610

APPLE COMPUTER, INC.

20525 Mariani Ave.
Cupertino, CA 95014
(408)996-1010

AT&T NATIONAL SPECIAL NEEDS CENTER

2001 Route 46
Parsippany, NJ 07054
(800)233-1222
(800)833-3232 TDD/TTY

AUDIOBIONICS (Renamed GARID, INC.)

AVOS, INC.

5230 Girard Avenue North
Minneapolis, MN 55430
(612)521-0008

BORG WARNER EDUCATIONAL SYSTEMS

(Renamed Jostens Learning Systems, Inc.)

CANON U.S.A., INC.

One Canon Plaza
Lake Success, NY 11042-9979
(516)488-6700

COMMODORE COMPUTER SYSTEMS

1200 Wilson Dr.
West Chester, PA 19380
(215)431-9100

COMMUNICATIONS RESEARCH CORPORATION

1720 130th Avenue N.E.
Bellevue, WA 98005
(206)747-2100

COMPUTER AIDS CORPORATION

124 W. Washington, Lower Arcade
Ft. Wayne, IN 46802
(219)422-2424

DIGITAL EQUIPMENT CORPORATION

146 Main Street
Maynard, MA 01754
(800)344-4825
(617)493-talk (demonstration voices)

DON JOHNSTON DEVELOPMENTAL EQUIPMENT

981 Winnetka Terrace
Lake Zurich, IL 60047
(312)438-3476

DU-IT CONTROL SYSTEMS GROUP, INC.

8765 Township Road 513
Shreve, OH 44676
(216)567-2906

EKEG ELECTRONICS COMPANY LTD.

P.O. Box 46199
Station G
Vancouver, B.C. Canada V6R 4G5

EPSON AMERICA, INC.

3415 Kashiwa Street
Torrance, CA 90505
(213)539-9140

GARID, INC.
9817 Valley View Road
Eden Prairie, MN 55344
(612)941-5464

GENESIS COMPUTER CORPORATION
P.O. Box 152
Hellertown, PA 18055
(215)861-0850

INTEX MICRO SYSTEMS CORPORATION
725 S. Adams Road
Birmingham, MI 48011
(313)540-7601

JOSTENS LEARNING SYSTEMS, INC.
800 East Business Center Drive
Mount Prospect, IL 60056
(312)296-0510

KEY TRONIC CORPORATION
P.O. Box 14687
Spokane, WA 99214
(509)928-8000

KROWN RESEARCH, INC.
6300 Arizona Circle
Los Angeles, CA 90045
(213)641-4306

MARYLAND COMPUTER SERVICES, INC.
2010 Rock Spring Road
Forest Hill, MD 21030
(301)879-3366

MICRO VIDEO
314 N. First St.
P.O. Box 7357
Ann Arbor, MI 48107
(313)996-0626

PHONIC EAR, INC.
250 Camino Alto
Mill Valley, CA 94941
(415)383-4000

PRENTKE ROMICH COMPANY
Electronic Aids for the Severely Handicapped
1022 Heyl Road
Wooster, OH 44691
(216)262-1984

J.A. PRESTON CORPORATION
60 Page Road
Clifton, NJ 07012
(201)777-2700
(800)631-7277

RAISED DOT COMPUTING
408 S. Baldwin
Madison, WI 53703
(608)257-9595

RESCUE SPEECH SYSTEMS
5937 Portland Ave. South
Minneapolis, MN 55417
(612)866-1661

SENSORY AIDS CORPORATION
Suite 110
White Pines Office Centre
205 W. Grand Avenue
Bensenville, IL 60106
(312)766-3935

SENTIENT SYSTEMS TECHNOLOGY, INC
5001 Baum Blvd.
Pittsburg, PA 15213
(412)682-0144

SHEA PRODUCTS, INC.
2355 Avon Industrial Drive
Auburn Hills, MI 48057
(313)656-2281

SOFTKEY SYSTEMS, INC.
4737 Hibiscus Ave.
Edina, MN 55435
(612)926-4905

STREET ELECTRONICS CORPORATION
Special Needs Division
1140 Mark Avenue
Carpinteria, CA 93013
(805)684-6621

TASH, INC.
Technical Aids and Systems for the Handicapped
70 Gibson Drive
Unit 1
Markham, Ontario L3R 2Z3
Canada
(416)475-2212

TECMAR, INCORPORATED
6225 Cochran Road
Solon, OH 44139-3377
(216)349-0600

TELESENSORY SYSTEMS, INC.
P.O. Box 7455
Mountain View, CA 94043
(415)960-0920

TEXAS INSTRUMENTS
P.O. Box 53
Lubbock, TX 79408
(806)747-3737
(800)842-2737

ULTRATEC, INCORPORATED

P.O. Box 4062
Madison, WI 53711
(608)273-0707

UNICORN ENGINEERING

6201 Harwood Ave.
Oakland, CA 94618
(415)428-1626

VOTRAX, INC.

1394 Rankin
Troy, MI 48083
(313)588-2050

VTEK, INC. (formerly Visualtek)

1625 Olympic Blvd.
Santa Monica, CA 90404
(213)829-6841

WORDS+, INC.

1125 Stewart Court, Suite D
Sunnyvale, CA 94086
(408)730-9588

ZYGO INDUSTRIES, INC.

P.O. Box 1008
Portland, OR 97207-1008
(503)297-1724

RESOURCE PROFESSIONALS

The following professionals, in addition to so generously sharing their time and expertise to make this book a reality, have consented to share their knowledge in their area of expertise with others seeking information.

BENDER, Sherri.

Sales representative
Creative Communication and Rehab Systems
10416 Boundary Creek Terrace
Maple Grove, MN 55369
(612)424-5591

(SpeechPAC, SpeechPAC/ScanPAC, Alltalk, Touch Talker,
Light Talker, Vois 130, Vois 135, Vois 140, Vois 150, Personal
Communicator, Canon Communicator M, ASC
Evalpac, EyeTyper, Ablenet) Loaner/rental equipment

CLAYBOURNE, Penny.

Patient Service Coordinator
Muscular Dystrophy Assoc.
1821 University Ave., Rm.N-170
St. Paul, MN 55104
(612)646-7557

Works with MD clients and their families

DUGAN, Michael.

Rehabilitation Program Advisor
State of Minnesota Service for the Blind
1745 University Ave.
St. Paul, MN 55104
(612)296-6080

Trains people how to use high tech adaptive equipment.

FULFORD, Raymond.

Rehabilitation Engineer
Courage Center
3915 Golden Valley Rd.
Golden Valley, MN 55422
(612)588-0811

Rehab team: assesses, modifies, and adapts devices to meet individual needs. Center offers a wide range of communication devices for client appraisal

GARWICK, Dave., (Consultant)

Special Education Service Center
Minneapolis Public Schools
256 Upton Avenue South
Minneapolis, MN 55405
(612)627-3085

The Center assesses, adapts, and loans some communication devices to schools and students in the Minneapolis School District.

HAGEN, Dolores.

CLOSING THE GAP
Box 68
Henderson, MN 56044
(612)248-3789

Author, publisher, lecturer, teacher.

HAGANS, Jerry C.

President, AMPS, Inc.
4830 Wyoming St.
Duluth, MN 55804
(218)525-1332 (office)
(218)525-1302 (home)

Special Friend Speech Prosthesis and Scanner

JACOBSON, Rachel.

Speech and Language Pathologist
Dept. of Communicative Disabilities.
Methodist Hospital
P.O. Box 650
Minneapolis, MN 55440
(612)932-5496

Works primarily with clients with head injuries and people with memory loss. Assesses and adapts communication methods and devices for these clients.

KISSICK, Lake, Jr.

Kissick's Consultants
1615 South 4th Street
Minneapolis, MN 55454
(612)332-5648

Communication specialist and sales representative for Prentke Romich Company, a manufacturer of augmentative devices and adaptive equipment.

KURKOWSKI, Frank.

Occupational Therapist
640 Humboldt Ave.
St. Paul, MN 55104
(612)227-8051

Designer of light sensitive adaptations using Blissymbolics to access Apple microcomputers at Humboldt Junior High School in St. Paul.

LIVIAK, John.

AVOS
5231 Girard Avenue North
Minneapolis, MN 55430
(612)521-0008

Computer science specialist working with the AVOS System designed for individuals who are blind.

MEYERS, Michael.

Occupational Therapist
Michael Dowling School for Crippled Children
3900 West River Pkwy
Minneapolis, MN 55406
(612)721-5508

Assesses and adapts communication methods and devices for students at the school.

MOFFA, Emil.

Softkey
4737 Hibiscus Ave.
Edina, MN 55435
(612)926-4905

Director & Designer of Softkey Modifications

OUREN, Mary.

Speech Pathologist
Trevilla Nursing Home
3130 Grimes Ave. N.
Robbinsdale, MN 55422
(612)588-0771

Assesses and adapts communication methods and devices for the residents.

REICHLE, Joe.

Assistant Professor
University of Minnesota
164 Pillsbury Dr. S.E.
Minneapolis, MN 55455
(612)373-4116

Works with developmentally delayed and mentally retarded children. Assesses needs and adapts communication methods to meet those needs.

SHEALEY, Susanne.

Occupational Therapist
Prentke Romich Company
1022 Heyl Road
Wooster, OH 44691
(216)262-1984

Director of Client Services. Conducts product seminars.

THOMAS, Jack E.

Speech and Language Pathologist
Mayo Clinic
Rochester, MN 55905
(507)284-3112

Assesses language abilities and needs of clients. Offers a wide range of communication devices for client appraisal.

VAN TASELL, Dianne

Associate Professor
University of Minnesota
Dept. of Communication Disorders
164 Pillsbury Dr. S.E.
Minneapolis, MN 55455
(612)373-4116

Works in the area of augmentative communication and specifically, in scientific speech synthesis research.

WERTZ, Florence C.

Speech & Language Pathologist
700 Arbogast
St. Paul, MN 55112
(612)484-3708

Extensive experience with Blissymbolics and computer systems for children who are severely disabled.

EVALUATION CENTERS

COMMUNICATION RESOURCE CENTER

Courage Center
3915 Golden Valley Road
Golden Valley, MN 55422
(612)588-0811

ACCESS (Augmentative Communication and Controls Evaluation Services)

Gillette Children's Hospital
200 East University Avenue
St. Paul, MN 55101
(612)291-2848

ACCESS at Gillette provides communication evaluations for nonverbal children and adults; makes recommendations for appropriate augmentative devices; provides trial use, training, special adaptations and education in the use of the recommended equipment and provides family support in obtaining the recommended equipment.

THE NACE CENTER

Non-verbal Augmentative Communication Evaluation Center
Speech, Language and Hearing Department
Crippled Children's Hospital and School
2501 West 26th Street
Sioux Falls, SD 57105
(605)336-1840

The Center provides evaluation services to persons with communication disorders. Individuals may also have motor impairments.

**TRACE RESEARCH AND DEVELOPMENT CENTER ON
COMMUNICATION CONTROL AND COMPUTER ACCESS**

University of Wisconsin
314 Waisman Center
1500 Highland Avenue
Madison, WI 53705
Dr Gregg Vanderheiden, Director
(608)262-6966 or 263-5697

A major research and resource site which specializes in the field of augmentative communication. The Center evaluates, designs, and adapts special pieces of equipment to meet individualized needs for all types of disabilities. The Center trains and consults with rehabilitation personnel. The University of Wisconsin also maintains a comprehensive data bank of aids and devices.

ORGANIZATIONS AND INTEREST GROUPS

CLOSING THE GAP

P.O.Box 68
Henderson, MN 56044
(612)248-3294

An organization that offers the following services to special education and rehabilitation professionals, individuals who are disabled and their families and friends: Closing the Gap newspaper, bookstore, a training and resource center, a professional development summer series and field services.

COPH-2 (Committee on Personal Computers and the Handicapped)
2030 Irving Park Road
Chicago, IL 60618
(312)477-1813

Membership is open to anyone interested in computers and the disabled. The membership includes rehabilitation providers, advocates, and manufacturers. They provide material information kits, free computer loans to members in the Chicago area, technical consultations, and low cost computer keyguards.

COURAGE CENTER COMPUTER CLUB

3915 Golden Valley Road

Golden Valley, MN 55422

(612)588-0811

Contact: Dennis Meyer

This user group consists of people with varying disabilities and other persons interested in working with the group. Different topics are explored at the monthly meetings

IN-TOUCH INC.

Suite 718

310 4th Avenue South

Minneapolis, MN 55415

(612)342-2066 TDD/voice

The purpose of this non-profit organization is to implement a comprehensive rehabilitative program of counseling and instruction for people with hearing and vision loss. Direct services are provided in the areas of communication, compensatory skills training, orientation and mobility, socialization, recreation, and in the use of appropriate technological devices. The organization also promotes support groups and community awareness, assists in providing housing opportunities for independent living and provides interpreter services for the deaf-blind community.

ISAAC

International Society for Augmentative and Alternative
Communication

Membership information contact:

Mrs. Susan Sansone

Membership Committee Co-Chairperson

New York State Association for Retarded Children, Inc.

Suffolk Chapter

2900 Veterans Memorial Highway

Bohemia, NY 11716

This is an international organization for persons interested in augmentative communication. ISAAC facilitates an exchange of information of benefit to individuals with communication disorders throughout the world. Members have access to their international conventions and various publications.

BOOKS AND PAMPHLETS

Communication Augmentation — A Casebook of Clinical Management

Beukelman, David R.; Yorkston, Kathryn M.; Dowden, Patricia A.

College-Hill Press, Inc.

4284 41st Street

San Diego, CA 92105

For professionals and students in education, physical therapy, occupational therapy, speech and language pathology, engineering and psychology. It is a practical and informative book on providing communication augmentation services to non-speaking individuals.

Directory of Services and Specialized Equipment for the Physically Impaired

IBM Corporation

Department 63C/028

Neighborhood Road

Kingston, NY 12401

Sections on computer and computer-related technologies, particularly for the visually impaired.

Funding of Non-Vocal Communication Aids: Current Issues and Strategies

Virginia Ruggles

Muscular Dystrophy Association 810 Seventh Avenue New York, NY 10019

This pamphlet outlines a four-step procedure to obtain funding for communication aids. Lists of other sources are included.

Guidelines for Seeking Funding for Communication Aids

Trace Research and Development Center for the Severely Communicatively Handicapped

Donna J. DePape and LaVonne A. Krause

314 Waisman Center

1500 Highland Avenue

Madison, WI 53706

These funding guidelines were developed from the experiences of people working in the field. They are intended as a starting point to assist in organizing a plan for the funding of a communication aid.

Handbook of Microcomputer Applications in Communication Disorders

Schwartz, Arthur H.

College-Hill Press, Inc.

4284 41st Street

San Diego, CA 92105

A book written specifically for professionals and students interested in communication disorders. Answers questions about choosing, buying, and using microcomputer hardware and software for clinical, research, teaching, and administrative applications in speech and language pathology and audiology.

International Software/Hardware Registry

Vanderheiden, Gregg

Trace Center

University of Wisconsin

314 Waisman Center

1500 Highland Avenue

Madison, WI 53705

This registry is a notebook-sized listing of hardware and software products. It is constantly revised and updated.

The Many Faces of Funding

Hofmann, Anna C.

Phonic Ear Inc.

250 Camino Alto

Mill Valley, CA 94941

The funding information contained in this three-ring binder is up-dated monthly re: changes in regulations, interpretations and qualifications. Numerous case histories are annotated, success cases via Medicare, Medicaid, Voc Rehab, Insurance Cos. etc. An excellent reference source for persons responsible for obtaining funding from third-party payers.

Microcomputer Resource Book for Special Education

Hagen, Dolores

Reston Publishing Company, Inc.,

Reston, VA 22070

A book for parents of handicapped children. It is "non-technical, non-teacher, non-computer". It is used extensively as a resource book in the training of professionals.

Personal Computers and the Disabled

McWilliams, Peter A.

Quantum Press

Doubleday and Company, Inc.,

Garden City, NY 11530

A book on microcomputers for the disabled written in non-technical terms. Contains a brand name buying guide, prices, and contact information. A resource directory.

Personal Computers and the Disabled — A Resource Guide

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Contents of the publication includes feature stories, such as: Computers Help the Deaf to Bridge the Gap, Computer Technology Breaks Down Barriers for the Blind, Personal Computing Offers New Potential to Children With Special Needs, and Computers Brighten the Future for Motor and Speech Disabled Persons. Also includes products for special needs, organizations, resource materials, a resource directory, and Trace Center Software Registry.

Personal Computers and Special Needs

Bowe, Frank G.

SYBEX, Inc.
2344 Sixth Street
Berkeley, CA 94710

The book provides examples of how handicapped people are using personal computers to overcome the limitations imposed by their disabilities. It describes a variety of equipment and software available for people with vision, hearing, mobility, and learning disabilities. Provides purchase and resource information.

Speech Systems for Your Microcomputer

Shade, Gary A.
Wayne Green Books
Peterborough, NH 03458
(603)924-9471

The book includes applications of voice input and output in industry and education for the handicapped. Guidelines are also included to help the reader determine which system is best for his or her use.

1986 Resource Directory

Closing the Gap

P.O. Box 68

Henderson, MN 56044

A 128 page guide to various organizations and companies whose services and products are applicable for use in special education and rehabilitation.

What You Should Know About TDDs.

Castle, Diane L.

Rochester Institute of Technology

National Technical Institute for the Deaf

One Lomb Memorial Drive

P.O. Box 9887

Rochester, NY 14623

This pamphlet is a brief summary of what TDDs can do and how they help a deaf person. Includes selecting, troubleshooting common problems, and sources for TDDs.

Governor's Report on Technology for People with Disabilities.

State of Minnesota, June, 1986

Developmental Disabilities Program

Minnesota State Planning Agency

201 Capitol Square Building

550 Cedar Street

St. Paul, MN 55101

(612)296-4018

(612)296-9962 TTY

Report of the Issue Team on Technology for People with Disabilities created to investigate the potential of high technology to improve the quality of life for Minnesotans with disabilities. It includes recommendations designed to create awareness for users, the public and professionals; to provide access to appropriate technology-based products and services, and to fund research and development that addressed the critical needs in the field.

PERIODICALS

ACC: Augmentative and Alternative Communication

Williams and Wilkins

P.O. Box 1496

Baltimore, MD 21203

Journal covering the field of non-speech communication. For speech and language pathologists, special educators, and all allied health professionals in non-speech communication. Quarterly.

BYTE

BYTE Publication, Inc.

70 Main Street

Peterborough, NH 03458

(603)924-9281

Single copy: Computer and the Disabled September 1982 VOL. 7, No.9

This issue was devoted to exploring computers and voice synthesis to assist in augmenting communication for the disabled.

The Catalyst

Western Center for Microcomputers in Special Education

1259 El Camino Real, Suite 275 Menlo Park, CA 94025 (415)326-6997

Presented in newspaper format, this publication provides information on recent research, hardware/software, and applications to special education.

Closing the Gap

P.O.Box 68

Henderson, MN 56044

(612)248-3294

A bi-monthly international newspaper dealing with microcomputers in special education and rehabilitation. Software and hardware reviews are regular features as well as new product information, articles on applications, etc.

Communicating Together

Blissymbolics Communication Institute
350 Rumsey Road
Toronto, Ontario
Canada M4G 1R8

Published quarterly as a means of sharing the experiences, systems, and techniques of non-speaking people with their families, communities, and the professionals who work with them. Special attention is given to the non-reader's augmentative communication system and the role of Blissymbolics.

Communication Outlook

Artificial Language Laboratory
Michigan State University
405 Computer Center
East Lansing, MI 48824-1024
(517)353-0870

Quarterly publication written expressly for individuals interested in the application of technology to the needs of persons who experience communication handicaps due to neurological and neuromuscular conditions.

The Disabled Challenger

Kissick's Consultants, Inc.
1615 South Fourth Street, Apt. M-3210
Minneapolis, MN 55454
(612)332-5648

Quarterly "positive" national newsletter. Up-to-date product techniques and information, exchange of ideas, upcoming events, and editorials. Unsolicited submissions are requested. Free introductory copy.

Link-and-Go

COPH-2 (Committee on Personal Computers and the Handicapped)
2030 Irving Park Road
Chicago, IL 60618

A quarterly newsletter published by COPH-2. Must be a member to receive it.

Raised Dot Computing Newsletter

Attn. David Holloway

310 South 7th Street

Lewisburg, PA 17837

(717)523-6739

Personal computer applications for the blind are the focus. Discussion topics include voice synthesizers, the use of micro-computers in braille translation, low-cost braille devices, and paperless braille. Technical notes on software use are provided, and hardware products extending the useage of Braille-Edit are featured. Both braille and audio subscriptions are available.

CONFERENCES SUMMARIES

1983 Workshop for the Handicapped

Institute of Electrical and Electronics Engineers Computer Society

Wertz, Florence C.

Wertz, John E.

"Blissymbol Learning and Communication with the Apple II Computer"

IEEE Computer Society Press

1109 Spring Street, Suite 300

Silver Spring, MD 20910

An alternative mode of communication is typically recommended for individuals whose disabilities prevent others from understanding their speech and who have not learned to read. One mode of communication which is being found appropriate for numerous non-verbal persons is Blissymbolics, a meaning-based symbol system.

Computer Technology for the Handicapped:

Proceedings from the 1984 Closing the Gap Conference*

Edited by Michael Gergen and Dolores Hagen

A collection of 45 presentations on microcomputer applications in an easy-to-understand format. Complete contact information on all presenters and nearly 60 hardware and software producers who exhibited at the conference.

Computer Technology For The Handicapped-Applications '85.

Selected Proceedings of the 1985 Closing The Gap Conference*

Edited by Michael Gergen

A collection of papers on the planning, selection and implementation of microcomputer technology for handicapped persons, for use by professionals, handicapped individuals, their families and associates. 60 presentations.

**Closing the Gap*

P.O. Box 68

Henderson, MN 56044

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*Discovery '83: Computers for the Disabled***

Edited by Janet E. Roehl

Conference papers cover the administrative uses of computers in facilities, use of computers in educational settings, and the direct use of computers by disabled persons.

*Discovery '84: Technology for Disabled Persons***

Edited by Christopher Smith

Conference papers report research results, software modifications, computer-related equipment design, and technologically innovative products and services for disabled persons.

*Discovery '85: Training and Technology for the Disabled***

Edited by Christopher Smith

Conference papers focus on the trend toward greater sophistication for assistive devices, the trend of developers to see the disabled customer as part of a peripheral market, and the need to insure that new computerized products will be fully accessible to persons with special needs, and technological innovation in training settings.

****Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout
Menomonie, WI 54751**



ABOUT THE AUTHOR

Peg Johnson is a unique woman who refuses to be defeated by severe athetoid cerebral palsy. In spite of extensive speech and motor limitations, she graduated from high school and college with high honors. She is extremely creative and for several years operated her own successful art business. Currently she is employed by the Minneapolis Public Library.

Peg's continuing search for new methods of augmentative communications has made her a perennial student in that field. Recently, she completed a two year research project exploring successful computer and voice synthesis applications being used to assist persons disabled by communication disorders. She is vitally interested in the assistive roles that computers can play in communications because of the rapidly changing technology and because of her own difficulty in expressing herself verbally.

"Making Your Computer Compatible With You" is a result of her desire to share information regarding practical computer applications and compatible adaptive devices for people with physical and communication limitations. Through the effective adaptation of micro-computer technology it is her belief that self-expression for the communicatively disabled will become a reality for more people more rapidly.

Taken from the September, 1985, issue of *THRIVE... The Magazine for People With Physical Limitations* in reference to a feature article entitled, "Making Your Computer Compatible With You" by Peg L. Johnson.